40 Rock (c)

POPULAR Computing WEEKLY

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This Week

News Desk

Thorn-EMI plans software on cable

THORN EMI is planning to offer its computer software on a cable tv channel.

At present the company has a cable franchise in Swindon and is looking for a second in Leicester. The cable networks will offer a selection of cable tv channels, including one which is planned to be exclusively for software. If the pilot schemes are a success then cable software could be distributed nationally.

The software channel would run a rotating top-20 computer games and a selection of home business and education packages.

Said Thorn EMI's Peter Chandler: "It is an obvious development for us — we have interests in cable, film and music and we also have a computer software division."

Continued on page 5

Electron add-ons from Sir

SIR Computers, the Cardiff based Acorn dealer, plans to get out a range of add-on expansion units for the Electron computer well before Acorn's own.

The first of Sir's units, a Centronics and joystick port is planned for the end of September. The unit will cost less than £40 and be compatible for use with BBC joystick controllers. The equivalent Acorn module is not now expected until late autumn.

Sir follows its first unit with four others — an RS423 port and a Rom board both scheduled for mid-October. In November, a Teletext adapter is planned giving the Electron Mode 7.

Prototypes of the Sir computers Electron add-ons will be on show at the Acorn User Show, held at the Cunard International Hotel, London on August 25-28.

Add on details from Sir Computers, 91 Whitchurch Road, Cardiff.

Continued on page 40



NEW!
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Action games that will grab you.
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HOWSZAT £6.90 1-2 PLAYER CRICKET Be a cricket star and enjoy all the hazards of cricket to beat your equally keen opponent
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How to submit articles
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All submissions should be typed and a double space should be left between each line Please leave wide margins

Programs should whenever possible be computer printed

We cannot guarantee to return every submitted article or program so please keep a copy If you want to have your own program returned you must include a stamped addressed envelope

Accuracy
Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish although we will always try our best to make sure programs work

This Week

Editorial

Chess is a game which has fascinated men for centuries For some reason this two player game has an ability to capture people s imaginations in a way that no other game has matched

The origins of chess are hard to pin down though it is believed to be descended from a board game played in ancient Persia

Chess is basically a war game simulation designed to encourage the use of tactics that can be applied to the battlefield The strengths and weaknesses of each piece are assessed, as are the strategic values of controlling the centre ground and defending your base Swords are not so much beaten into ploughshares as sublimated into knights and pawns

Programming a computer to play chess is an extraordinarily difficult business Each possible move must be evaluated and compared with every other possible move Illegal moves must be discarded, as must moves which leave the computer defenceless Looking ahead more than a few moves is very time consuming and slows the game down to a point where boredom sets in

But, chess computers are getting better all the time Human Grandmasters may find that their supremacy is being challenged sooner than they think Perhaps the programmers will inherit the earth after all

Next Thursday

Try and collect all the barrels from the four floors and roll them down to the bottom — but beware of the green monsters Barrels and Ladders for the Spectrum by David Millington

AGF

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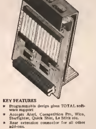
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Thorn-EMI

Continued from page 1

At the moment Thorn EMI is looking at one-way transmission of software although interactive systems with dynamic pages could be a future possibility

An experimental cable software system, using an Atari computer and software, was demonstrated by Thorn earlier this year at the Cable '83 show The display used a teletext type arrangement of branching pages to list a menu and down-load a choice of games software via cable A similar system, capable of broadcasting software either by cable or satellite will be shown by Thorn at the Cable and Satellite Technology exhibition to be held at the NEC, Birmingham in September

According to Peter, a viable cable telesoftware system has to be compatible with all the current computer systems and distribute current top-selling commercial quality material

"*Submarine Commander* is one title we might put on cable — it is a top-selling title and has been written across a range of popular machines," he says

To use the system, a special Rom cartridge would be plugged into the user's micro and act as a kind of software filter — making sure that *only* software available for *the* user's particular type of machine can be down-loaded

"The system is now entirely possible," commented Peter, "all we are waiting for is the second generation of teletext chips that will make the system much faster to use

Thorn EMI is already well advanced with plans for a music cable channel and is now looking at satellite distribution for its material — including the software channel — to Europe

Eighth ZX fair at Ally Pally

THE eighth ZX Microfair is being held this weekend

The venue is again Alexandra Pavilion Alexandra Palace London and the cost to get in is £1 and 50p

The one-day show on Saturday, August 20 will be open from 10 am to 6 pm

Phoenix rises from the ashes

ONE of the two founders of Romik Software — the predominantly Vic20 and Dragon games house — has left to form his own company, Phoenix Software

Gerry Rose

The split between Romik's Gerry Rose and Mike Barton comes as a shock since the company is still less than a year old Formed last September, Romik achieved a turnover of more than £100,000 in its first six months trading

"Mike Barton and I had an acrimonious falling-out in which he used his casting vote as chairman of the company to try to get me out" explained Gerry Rose "He failed, and eventually we agreed an out-of-court settlement"

Mike Barton tells his side "I bought Gerry out for quite a large sum — a very large sum It has always been my company and I wanted the business back"

Now Gerry Rose has set up a new software house — Phoenix — which will be launched at this year's *Personal Computer World* show in September

Says Gerry "Phoenix is the bird which rose from the ashes — that's why I chose the name" To start off with Gerry plans software for the Vic20 and Spectrum based on what he describes as a completely new idea "Some people enjoy arcade games, others prefer adventures," he says, "the Phoenix idea is to give people the best of both worlds"

Mike Barton remains undaunted by the split He plans to release 16 new titles under the Romik banner in the next three weeks included are *Atom Smasher* (BBC), *Seesaw Scramble* (Atari) *Power Blaster 3D Monster Craze* and *Atom Smasher* (all Lynx), *Zogoo's Kingdom* and *Golden Apple of Zeus* (Vic20), *Dickies Diamond* and *Tomb of Xerops* (Commodore 64) and *White Crystal* (Dragon 32)

Apocalypse is here

APOCALYPSE software appears to be the first independent software house to write for the Aquarius computer

Aqua Paks 1 and *2* are compilations with a number of games on each tape

Other titles still in the pipeline include *Aquamarine* (a *Scramble* variant) *Aquaman* (a *Pac-man* game), *Aquasplat* (a *Blitz*-type game) and *Grandprix* (a driving game)

All titles will cost £9 95 and be available from the new company, Apocalypse Software, 5-7 Stert Street, Abingdon, Oxon

Discs for 480Z

RESEARCH Machines has announced the launch of its disc drive system for the Link 480Z machine

The units, either single or double drives, can operate in either a single- or double-density disc mode

In double-density mode the single disc system has a capacity of 328K Like the 380Z system, the units are compatible with the CP/M 2 2 operating system

Prices are £616 for the single disc drive and £924 for the double Educational establishments should, however, be eligible for around a 20 per-cent discount on these costs

An ideal party game

THIS curious looking device costs £15 95 and is an electro-mechanical game based on the arcade favourite Donkey Kong

Kong Man *stands 15in tall and is, apparently, an ideal party game The object of the exercise is to negotiate a steel ball from* the bottom *of the structure to the top avoiding a variety of obstacles*

The toy is made by Tomy and should appear in the shops for Christmas

The Dragon goes Forth

FOR £14 it will soon be possible to buy a disc-based version of Forth for the Dragon

M and J Software plan the product, which is compatible with the Premier Microsystems Delta disc system, for the beginning of September The language is a fig-Forth implementation and contains its own macroassembler

Forths seem to be about in profusion for the Dragon Cassette-based versions are available from M and J, Oasis, Microtanic and Microdeal

Contact M and J, 34 Grays Close Scholar Green, Stoke-on-Trent, Oasis, Lower North Street Cheddar Somerset, Microtanic, 16 Upland Road, Dulwich London, and Microdeal 14 Truro Road, St Austell, Cornwall

Latest microdrive news

IN this series of bulletins we hope to keep you informed about delivery schedules for the Sinclair ZX Microdrive

Here is what has happened so far: Popular Computing Weekly *received its microdrive order form on July 29 Order form completed and returned to Sinclair July 29 Cheque not yet cashed No acknowledgement received Days since order 21*

It's time to S-T-R-E-T-C-H your Micro with new books and software from McGraw-Hill

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  This book explains how file handling programs are designed used developed and written Details of the accompanying software are given below
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POP WK

Easy to learn

I hope I can claim the highest score on Bug-Byte's *Another Vic in the Wall* of 83,170. Until this high score I had only managed a mere 11,000 (or thereabouts).

Ever since this mammoth score, I have regularly scored more than 60,000. The secret to the high scores is a rather simple and easy to learn method, which I am sure many Vic users will already have picked up. But, for those who haven't:

(1) Make sure that you get the ball on as much of an angle as possible, with quite a bit of speed.

(2) Try to keep directly underneath, so that you can easily intercept the ball when it reaches your bat.

(3) Just keep repeating steps one and two and success should come in time.

Also, I would like to know if anybody has beaten my highest score.

Philip Bidwell
20 Hough Lane
Leyland
Lancs PR5 1SD

Object of the game

I would like to make a comment on the letter from Steven Wilson (*PCW* 4-10 August) regarding his conceptions about Melbourne House's excellent *Penetrator* program "Pooh!"

He says that there is a fifth level in which you encounter an impassable mountain which always destroys your ship. He believes this sheet to be a bug. He is wrong, this sheet is not a bug at all, but is in fact the whole object of the game. If he were to read his cassette inlay he would discover that the idea of the game is to "Penetrate" (hence the program title *Penetrator*) through four defence rings and blow up an illegal cache of neutron bombs.

The bomb store is on the fifth sheet. As you enter the fifth sheet, a small and narrow vertical shaft comes into sight in the lower region of the screen. You have to launch one of your bombs down this shaft where, at the bottom there are two neutron bomb stores. Miss even one of them and it's "Goodnight from him!", because, as Steven Wilson correctly reveals, the tunnel narrows to a point and the ship crashes helplessly into a mountain.

However, if you do succeed in dropping a bomb down the shaft, the screen goes into a brief spasm of pyrotechnics and a nice little tune is played for you. You then receive 1000 points (this score increases by 1000 every time a neutron bomb store is destroyed) and the danger level is reduced to zero. Having done this, you then have to work your way back through the stages and back to the first sheet, whereupon the danger level is reduced to zero again and the mission starts all over again.

Just for the record, my high score on *Penetrator* stands at 98,000 points (I made it to the neutron bomb store and back five times).

May I also offer a tip to *Penetrator* owners who are dozing off at their consoles as the *Penetrator* handwriting is being drawn? Press *Enter* and all the handwriting will appear on the screen at once.

PS. Your magazine is the only one that I actually look forward to buying every week. Keep up the good work.

S Ryatt
13 Laburnham Road
Hayes
Middlesex

Beltman bug

Thank you for an excellent game. I am, of course, talking about *Beltman* (*PCW* 21-27 July) which I entered and have been playing ever since.

However, there is a bug in the program which only becomes apparent after two screens have been cleared. The 'time' statement moves down one line for no obvious reason and the program crashes, giving an 'out of screen' error report. This is remedied by slightly amending program line 29. Instead of using '*Tab 13*,' substitute '*A 1,13*'.

I have included a printout of the amended line and also a couple of other changes which your readers may find of interest. I have added a screen no' report, to remind hectic beltmen how many levels of play they have completed. Also, I have changed the seemingly meaningless numbers at the top of the screen to graphics which resemble fuses (after all, that is what they are supposed to be).

```
Line 7 is a line of
graphic "M"
0007 PRINT AT 0,0;"
XXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXX
0014 DATA 128,88,24,
24,24,24,58,128
0020 PRINT AB,AT 1,0,
"Score>",sc,"  ",
AT 1,12,"Time>",t/~
,AT 1,24,"Screen ",p
1000 RESTORE 14 FOR
i=0 TO 7 READ a
POKE USR "h"+i,a
NEXT i
MODIFICATIONS TO
BELTMAN
```

I hope you will find this useful. Before I go, how about a machine code series in *PCW* (especially aimed at the Spectrum)?

M Barrett
13 Harforlen Road
Peverell
Plymouth
Devon PL2 3NU

We ran a mammoth machine code series last year by Ian Stewart and Robin Jones, starting in *PCW* 23 September, 1982. It may be a little soon to start another series machine code — please write in and let us know your views.

Full 3-D view

While reading *PCW* Vol 2 No 30, I noticed a letter from N Webber of Middlesex. I have a BBC B and I purchased a 747 flight simulator from Doctor Soft, but I was disappointed with it. There are various points which make this Basic program unbearable. There is no fuel limit, it takes place at night, you are able to reach 200,000 ft, etc.

In the 747 advertisement it states 'full 3D view of runway'. I do not call a horizon line and an outline of a triangle a 'full 3D view of a runway'.

But, I would like to recommend another flight simulator — *F for Freddie* — a machine code program from Kansas City Systems.

Martin Castree
40 Burnedge Fold Road
Grasscroft
Oldham
Lancs OL4 4EE

Green on black

My thanks to Dave Vaughan (*PCW* letters, 4-10 August) for his comments about my "Green on Black" article (*PCW* Dragon page 14-20 July). The problem he is having with the *Get* command is caused by the fact that not only does *Cls* call routine 416, so does *Get*.

The way round this problem is to check that the return address is going to *Cls*. Unfortunately, I have not left enough memory free to add this, without moving the whole program down in memory and consequently rewriting the whole thing. The simplest solution is this: whenever you are going to use a *Get* command type *Poke 416, 57* first and *Poke 416, 126* afterwards, for example:

```
100 POKE 416 57 GET(X,Y) -
    (W,Z),A POKE 416 126
```

Brian Cadge
311 Church Road
Yardley
Birmingham B25 8XR

A few points

Many thanks for the ZX Microdrive review published last week (*PCW*, 28 July-3 August). However, I must bring a few clarifying points to your attention. These were forwarded to me by one of our design engineers.

Printers and terminals use the *Tab* character in a way which is inconsistent with each other and in a way which is inconsistent with the Basic use of *Tab*. Control code sequences appropriate to a specific printer or terminal may be printed on the "*b*" file to achieve the desired effect.

There is "handshaking" on the Net data cannot be lost even if the receiver is not waiting for it.

The *Move* command cannot be used to pirate software.
It will be "impossible" to pirate programs that are protected.

There is no problem with the RS232 interface. It is as flexible as any RS232 interface on any other computer.

Sinclair Research Ltd
23 Motcomb Street
London SW1X 8LB


48K SPECTRUM
VALH

[illegible]

[illegible]

THE GOOD NEWS

Popular Computing Weekly said, " VALHALLA's undisguised intention is [illegible] the title, [illegible] adventure game [illegible] ".

It will.

INFORMATION

VALHALLA will be available to distributors, retailers and by direct mail.

Further details will be published in this and other magazines early in September.

It is now anticipated that VALHALLA will be available in the week commencing September 18.





ALLA

Battleships

A new game for the Vic20 by I Shambrook

This program was written for a Vic with an additional 3K Ram. The object of the game is to destroy the opposition's navy, before your own fleet is sent to the sea-bed.

First, you are asked to plot the locations on the ocean map grid of the individual units under your command (the *Return* key must be hit after each location has been specified). These units are shown in a key which is illustrated as part of the program. The opposition navy is plotted using random numbers generated by the computer.

You are then required to input your first guess as to where you think the opposition's fleet is situated (there is no need to hit *Return* after specifying the row number and column letter). If you miss, then the letter *M* will be *Poked* up on to the screen, while a hit will be greeted with a black square on the screen.

The computer then has its turn in guessing. As its moves are the results of calculations using random numbers, the computer is allowed two goes compared to your one. If you find that this is still not enough to prevent you from winning every time, then it is easy to change the game so that the computer has three or even four guesses. To do this change line 854 to

```
FOR J = 1 TO 3
```

If you manage to score a hit then, as the computer is only permitted to plot certain shapes to represent its navy, it should be fairly easy to work out what it is that you have hit — thus you can quickly hit any adjacent parts of the target before moving on to another unit. If a hit is scored, you will be given an extra guess.

The game continues with the player and computer moving in turn, until one of the navies has been completely destroyed. Once this has happened, the game finishes and the user is asked if he would like another game.

The main variables used in the program are

PG%	Two-dimensional integer array storing contents of player's grid
CG%	Two dimensional integer array storing contents of computer's grid
DE, J, C	Counters
A$, B$, C$, D$, E$, F$	Used to hold characters input from the keyboard
VP	Vertical position in grid
LP	Horizontal position in grid
QW	Holds the ASCII value of B$
ER	Stores the numerical value of A$
SC	Number of squares the player has plotted when inputting the positions of the naval units
S1	Poke value of speaker 1
S2	Poke value of speaker 2
S3	Poke value of speaker 3
S4	Poke value of speaker 4
QW$	Used to empty keyboard buffer
K	Holds the ASCII value of E$
L	Stores the numerical value of D$
PS	Number of hits player has scored
CS	Number of hits scored by computer
H$	Used to see if player wants another game

Program notes

37	Puts poke values of each speaker into variables S1, S2, S3, S4 respectively
40	Dimensions the arrays storing the player's and computer's map grids
49	Changes screen and border colours
60-137	Prints instructions
65 118	Keyboard bleeps
166	Sea noise
170-198	Pokes grids on to screen
209 213	Prints co-ordinates for each grid
229	Stops sea noise
249-299	Plots two aeroplanes on to computer grid
255	Generates two random numbers to represent vertical and horizontal starting positions of plane
269	Prevents planes being plotted outside the grid area
260-265	Prevents naval units from being plotted in the same square
279	Sets elements of array in which plane has been plotted to 1
290-322	Plots ammunition dump
330 357	Plots aircraft carrier
360-390	Plots battleship
400-430	Plots cruiser
440-470	Plots submarine
479-495	Plots patrol launch
500-530	Subroutine in which two random numbers are generated. These are used in determining vertical and horizontal positions of all navy units
510	Generates random number between 1 and 21 for column letter
520	Generates random number between 1 and 10 for row number
550-688	Player inputs his navy positions
610-620	Inputs row number — number is only accepted if out of range 0-9
630-631	Inputs column letter — letter is only accepted if in range A-U
660	Checks to see that player has not made a mistake in inputting a plot
667	Keyboard bleep
670	If position has previously been specified then returns to get new co-ordinates
671-672	Sets element in array in which plot has been specified to 1. Pokes asterisk on grid in position input
680	If all units have not been input then returns to get more co-ordinates from keyboard.
699-821	Player's guess is input
735	Empties keyboard buffer
740 750	Inputs row number of guess
760-770	Inputs column letter of guess
785	Prevents player from guessing the same position more than once
800-801	If position is empty letter 'M' is poked on to grid
811	If position is occupied player has scored a hit. Player's score is incremented by 1
200	'Hit' noise temporarily changes screen and border colours
850-990	Computer's guess
865	Generates random numbers to determine co-ordinates of guess
870	If this position has previously been guessed then new co-ordinates are generated
880-885	If computer has scored a hit its score is incremented by one. 'Hit' noise is generated
890	Sets element in array to two showing that it has already been guessed
1000	If computer has won then prints 'I won'
1010	If player has won then prints 'You won'
1100	Delay loop
1110	Clears screen, asks if player would like another game
1120	If player inputs 'Y' then program runs again
1130	If player inputs 'N' then program execution is terminated ■



```
10 REM ***BATTLESHIPS***
30 REM ***COPYRIGHT***
30 POKE36878,15:S1=36874:S2=36875:S3=36876:S4=S3+1
45 DIM PO%(10,21),CO%(10,21)
45 POKE 36879,26
50 REM ***INSTRUCTIONS***
60 PRINT"THE OBJECT IS TO
   DESTROY THE COMPUTER NAVY BEFORE YOUR OWN"
65 PRINT"FLEET IS SUNK."
70 PRINT"YOU MUST PLOT YOUR
   FORCES ON YOUR GRID BY SPECIFYING THE ROW"
80 PRINT"NUMBER FOLLOWED BY THE COLUMN LETTER."
85 PRINT"HIT C TO CONTINUE"
95 GET A$:IF A$<>"C"THEN95
96 POKES3,200:FORDE=1TO30:NEXT:POKES3,0
100 PRINT"YOUR NAVY CONSISTS OF:"
105 PRINT"        AEROPLANE(2 OF)"
110 PRINT"            -AMMO DUMP(1)"
115 PRINT"       AIRCRAFT         CARRIER(1)"
120 PRINT"       BATTLESHIP(1"
125 PRINT"       CRUISER(1)"
130 PRINT"       SUBMARINE(1)"
135 PRINT"       PATROL        LAUNCH(1)"
140 PRINT"HIT S TO START"
150 GET A$:IF A$<>"S"THEN GOTO 150
155 POKES1,200:FORDE=1TO30:NEXT:POKES1,0
160 PRINT" O.U.
165 POKES4,250
170 FOR J=7702 TO 8163
180 POKE J,200:POKE 30720+J,3
190 NEXT J
200 PRINT"ABCDEFGHIJKLMNOPQRSTU"
210 PRINT" 0..."
213 PRINT"0
220 POKES4,0
240 REM ***PLOT 2 AEROPLANES***
250 FOR J=1 TO 2
255 GOSUB 500
255 IF LP>19 OR VP>8 THEN255
260 IFCO%(VP,LP)=1 OR CO%(VP,LP+1)=1 OR CO%(VP,
    LP+2)=1 THEN GOTO 255
265 IF CO%(VP+1,LP+1)=1 THEN GOTO 255
270 CO%(VP,LP)=1:CO%(VP,LP+1)=1:CO%(VP,LP+2)=1:CO%
    (VP+1,LP+1)=1
280 NEXT J
290 REM ***AMMO DUMP***
300 GOSUB 500
303 IFLP>17ORVP<1THEN300
305 IF CO%(VP,LP+3)=1 ORCO%(VP,LP+4)=1 ORCO%(VP-1,
    LP)=1 ORCO%(VP-1,LP+4)=1 THEN GOTO 300
310 IFCO%(VP,LP)=1 OR CO%(VP,LP+1)=1 OR CO%(VP,LP+2)
    =1 THEN GOTO 300
320 CO%(VP,LP)=1:CO%(VP,LP+1)=1:CO%(VP,LP+2)=1
    :CO%(VP,LP+3)=1:CO%(VP,LP+4)=1
322 CO%(VP-1,LP+4)=1:CO%(VP-1,LP)=1
330 REM ***PLOT AIRCRAFT CARRIER***
340 GOSUB 500
345 IF VP<1 OR LP>17THEN GOTO 340
350 IFCO%(VP,LP)=1 OR CO%(VP,LP+1)=1 OR CO%(VP,LP+2)
    =1 THEN GOTO 340
352 IF CO%(VP,LP+3)=1ORCO%(VP-1,LP+1)=1ORCO%(VP-1,
    LP+2)=1ORCO%(VP-1,LP+3)=1THEN GOTO 340
353 IFCO%(VP-1,LP+4)=1THENGOTO340
354 CO%(VP,LP)=1:CO%(VP,LP+1)=1:CO%(VP,LP+2)=1:CO%
    (VP,LP+3)=1:CO%(VP-1,LP+1)=1
357 CO%(VP-1,LP+2)=1:CO%(VP-1,LP+3)=1:CO%(VP-1,LP+4)=1
360 REM ***PLOT BATTLESHIP***
370 GOSUB 500
375 IFLP>17THEN370
380 IF CO%(VP,LP)=1 OR CO%(VP,LP+1)=1 OR CO%(VP,LP+2)
    =1 OR CO%(VP,LP+3)=1 THEN 370
382 IF CO%(VP,LP+4)=1 THEN GOTO 370
390 CO%(VP,LP)=1:CO%(VP,LP+1)=1:CO%(VP,LP+2)=1:CO%
    (VP,LP+3)=1:CO%(VP,LP+4)=1
400 REM ***PLOT CRUISER***
410 GOSUB 500
415 IF LP>18 THEN 410
420 IFCO%(VP,LP)=1 OR CO%(VP,LP+1) OR CO%(VP,LP+2)=1
    OR CO%(VP,LP+3)=1 THEN 410
430 CO%(VP,LP)=1:CO%(VP,LP+1)=1:CO%(VP,LP+2)=1:CO%(VP,
    LP+3)=1
440 REM ***PLOT SUBMARINE***
450 GOSUB500
455 IF LP>19 THEN 450
460 IF CO%(VP,LP)=1 OR CO%(VP,LP+1) OR CO%(VP,LP+2)=1
    THEN 450
470 CO%(VP,LP)=1:CO%(VP,LP+1)=1:CO%(VP,LP+2)=1
479 REM ***PLOT PATROL LAUNCH***
480 GOSUB500
483 IFLP>20ORVP<1ORVP>8THENGOTO480
485 IFCO%(VP,LP)=1ORCO%(VP,LP+1)=1ORCO%(VP+1,LP)=
    1ORCO%(VP+1,LP+1)=1THENGOTO480
490 CO%(VP,LP)=1:CO%(VP,LP+1)=1:CO%(VP+1,LP)=1:
    CO%(VP+1,LP+1)=1
495 GOTO600
500 REM ***COMPUTER RANDOM NUMBERS***
510 LP=INT(RND(1)*21+1)
520 VP=INT(RND(1)*10)
530 RETURN
550 REM ***INPUT NAVY POSITIONS***
600 FOR J=1 TO 10
601 PRINT"POSITION NAVY":POKES3,150:FOR DR=1
    TO 200:NEXT
602 PRINT"         ":POKES3,200:FOR DE=1 TO 200:
    NEXT:NEXT
605 POKES3,0
610 GET A$:IFA$=""THEN610
620 IFASC(A$)<48ORASC(A$)>57THEN610
630 GET B$:IF B$=""THEN630
631 IF ASC(B$) <65 OR ASC(B$) >85 THEN GOTO 630
635 GW=ASC(B$):ER=VAL(A$)
650 GET C$:IF C$=CHR$(13) THEN GOTO 667
660 IF C$=CHR$(20) THEN GOTO 610
665 GOTO 650
667 POKES3,180:FORDE=1TO30:NEXT:POKES3,0
670 IF PO%(ER,GW-64)=1 THEN GOTO 610
671 PO%(ER,GW-64)=1:SC=SC+1:POKE 7703+22*ER+
    (GW-65),42
672 POKE 30720+7703+22*ER+(GW-65),0
680 IF SC<30 THEN GOTO 610
699 REM ***PLAYERS GUESS
700 PRINT"YOUR GO         "
735 FORC=0TO10:GETQW$:NEXTC
740 GET D$:IFD$=""THEN740
750 IFASC(D$)<48ORASC(D$)>57THEN740
760 GET E$:IF E$="" THEN760
770 IF ASC(E$) <65 OR ASC(E$) >85 THEN GOTO 760
790 K=ASC(E$)-64:L=VAL(D$)
794 FORV=230TO130STEP-.5:POKES2,V:NEXT:POKES2,0
795 IF CO%(L,K)=2 THEN PRINT"REPEATED GUESS"
    :FOR J=1 TO 1000:NEXT J:GOTO 700
800 IF CO%(L,K)=0 THEN POKE 7945+22*L+K-1,13:
    CO%(L,K)=2
801 POKE 30720+7945+22*L+K-1,0
805 IF CO%(L,K)=0 THEN GOTO 850
810 TR=7944+22*L+K
811 IFCO%(L,K)=1THENPOKETR,160:PRINT"HIT
    ":CO%(L,K)=2:PS=PS+1:GOTO820
815 GOTO850
820 POKES4,180:POKE36879,8:FORV=15TO0STEP-.04:
    POKE36878,V:NEXT:POKES4,0:POKE36879,26
821 POKE36878,15
822 IF PS=30 THEN GOTO 1010
823 GOTO 699
850 REM ***COMPUTERS GUESS***
854 FOR J=1 TO 2
855 PRINT"MY GO      "
860 GOSUB 500
870 IF PO%(VP,LP)=2 THEN GOTO 860
875 FOR DR=1 TO 1000:NEXT DE
876 IF PO%(VP,LP)=0 THENPOKE7702+22*VP+LP,13:POKE
    30720+7702+22*VP+LP,0:GOTO890
880 POKE 7702+22*VP+LP,160:POKE 7702+30720+22*VP+
    LP,0:CS=CS+1
885 POKES4,180:POKE36879,8:FORV=15TO0STEP-.04:
    POKE36878,V:NEXT:POKES4,0:POKE36879,26
888 POKE36878,15
890 POKES2,200:FORDE=1TO30:NEXT:POKES2,0
900 PO%(VP,LP)=2:IF CS=30 THEN GOTO 1000
910 NEXT J
920 GOTO 699
1000 PRINT" I WIN!!  ":GOSUB2000:GOTO 1100
1010 PRINT"YOU WIN!!       ":GOSUB3000
1100 PRINT"
1110 PRINT"ANOTHER GAME(Y/N)?":POKE36875,200
1115 FORDE=1TO50
1120 GET H$:IF H$="Y"THEN POKE36875,0:RUN
1125 IF H$="N" THEN POKE36875,0:END
1126 NEXT
1130 PRINT"
1135 POKE36875,170
1140 FORDE=1TO250:NEXT
1150 GOTO1110
2000 FORO=1TO5
2010 FORP=255TO160STEP-.5:POKE36874,P:POKE36876,P:NEXT
2020 NEXT:POKE36874,0:POKE36876,0
2030 RETURN
3000 FORO=1TO5:FORP=130TO250
3010 POKE36874,P
3020 POKE36876,P
3030 NEXT
3040 FORP=250TO120STEP-1
3050 POKE36876,P
3060 POKE36874,P
3070 NEXT:NEXT
3080 POKE36876,0:POKE36874,0:RETURN
READY.
```



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The gang of four

***David Kelly** writes the Ultimate Street Life*

The people behind Ultimate Play the Game think their company produces the best software And they are certainly not shy about telling people

They may be right At least they are a contender Their first game for the Spectrum — *Jet Pac* — released in May caused quite a stir among rival software houses With a strongly arcade theme the emphasis was on on-screen visual presentation and fine smooth graphics Yet the thing that really surprised people was that the game was very economical on memory, seeming to cram a very great deal into only 16K Since May the program has become a best-seller reaching the top of the W H Smith top ten at the beginning of this month Other games have also been released — *Psst Cookie* and *Tranz Am* — and a lot of people are asking Who are these newcomers Ultimate?

The company comprises four equal partners — Tim Stamper Carole Ward John Lathbury and Chris Stamper

All four prior to Ultimate worked as a development team for the arcade industry Before that Carole was trained as a graphic designer and the other three all have backgrounds in various aspects of electrical and electronic engineering

They began working as the design team of a major US arcade machine manufacturer — either Sega or Atari Tim would not say which — over three years ago He says ' We were all in right at the beginning of the arcade boom He feels that the market has changed since then — with the arcades giving way to home computers as the quality of micro games has improved ' Why spend 20p to play when you can pay £5 50 to have the game whenever you want it, agrees Carole

In 1982 the four decided to go solo and Ultimate came into being "We went our own way — we are still developing for the arcade industry but the Spectrum market attracted us because in the UK the machine had a phenomenal growth rate Thus Ultimate became the first independent company to make the cross-over from coin-ops to micros As a small company we decided we couldn t compete in the arcade industry explains Chris 'Sega for example has just spent $1 5m on developing its computer/laser disc system so we had a choice carry on producing conventional arcade titles or move into a different arena

Home computer software required a completely different approach Developing for the arcades the idea for the game comes first and then *both* the hardware and software are designed together to implement it As a result Tim Chris and John have experience of both hardware design and program writing on a range of different processors Z80 6502, 6510, 8086 68000 and 1802

The difference with the home computer market is that everyone has the same machines to work with With the Spectrum everyone is on an equal footing says John We looked at the competition at the end of last year and to be honest we didn t think much of the standard of software being sold

Tim The Spectrum is Z80 — a nice processor — and we know what it does There are a few strange things in the Spectrum hardware which perhaps our design team wouldn t have done — but all in all it s not a bad machine

' Our background means we can produce a top quality game and we have years more experience than most of our competitors

Ultimate do not use freelance programmers 'People will buy an Ultimate game because they know it will be good, says Carole ' We have to guarantee a high standard of programming — and we do that by writing all the programs ourselves " Tim again ' We chose to write 16K Spectrum games because they can run on more machines We could produce a tremendous game in 48K — but our development time would go up We could either do one 48K program a month or two 16K — and we chose to do two 16K

' Besides programming in 16K is a very good exercise — it keeps the code tight The idea for an Ultimate game is well planned before fingers ever type on keyboards The game and its flow are first planned on a storyboard Then a series of screen displays are programmed Ultimate use a development system to program on — a variation on the tools they used to design for the arcades Chris reckons the 32-bit multi user system they use is as good as any of the custom-made systems in use by the big software development companies in the US A program under development is run simultaneously on the development system and the Spectrum

The gang of four always work together on each project — and the ideas for the games so far released have been kicking around in their collective heads for three years Says Tim ' We know what we will do now all the way up to Christmas Different people have different preferences and we like variety in our programming diet '

Ultimate tries to stick with a set way of approaching a program but it does not as some houses do use standard routines in its programs "If we did that we would have 32K programs not 16K programs, explains Tim In each case the routines are optimised for each game An arcade machine may have 256 sprites on a moving background and a bit-mapped screen The Spectrum only has a foreground and background colour

"Our graphics do look like the arcades, grins John "but that is only through careful game-flow design

Not using standard routines has another advantage If anybody disassembled one of our programs they will only see what we were doing a couple of months ago!

Now Ultimate is branching out and will be producing material for the Vic20 Atari and Commodore 64 plus of course more for the Spectrum *Jet-Pac* will go on to the 8K expanded Vic20 this month and three other programs are at an advanced stage of production — including an arcade/adventure hybrid and a new arcade game both for the 48K Spectrum The second of these should be ready within the next four weeks 'There is now an awful lot of software out for the Spectrum but ours will always sell because it s better What other people get into 48K we can put in 16 claims Tim

Ultimate has been approached by other software houses to write for them but the answer has always been No

We are doing this for ourselves — not to work for another company, explains Carole

We have worried a lot of our competitors Suddenly *Jet Pac* came out from nowhere but in fact we have more experience than all of them I think we have raised the user s expectation of what the Spectrum can do and software houses have been forced to raise their standards in line with us, says Tim

"Just like the arcades the market is becoming very selective and the next few months will see a filtering out of the companies not up to scratch

What we are waiting for now is a home micro with a fast 16-bit processor — something like the 8086 or 68000 We have the equipment to produce software for it very quickly and I don t know if other houses can do that When such a machine comes out we will manufacture software for it — and that will sell the computer

It makes you wonder how Clive managed without them ■

Play the game . . .

***David Lawrence** fights off the mutant camels in this review of Commodore 64 software*

Now that the price of the Commodore 64 has been slashed to what must be a more realistic figure for the home micro market, we can look forward to a flood of games and personal software. That can only be for the good since, up to now, the 64 software available has been severely limited compared to some other machines on the market. Hopefully, the period in the price wilderness will also have given some of the software houses a chance to get used to the facilities that the 64 has to offer to the commercial programmer.

The danger is that the 64, more than any other recent micro, will produce more than its fair share of superb software and also of absolute disasters. The reason is that with three-channel sound, the sprite facility and an outstanding colour capability, it is possible to make almost any game, no matter how trivial and boring, seem exciting on first sight. On most other machines, the presence of high quality sound and moving graphics are a fair indication that the programmer is of some quality. On the 64, it may simply mean that he or she has read the manual.

If what follows, therefore, sounds a little harsher than the average review, it is only because the 64 really demands a higher quality of game than machines like the Spectrum and consumers have the right to make that demand clear from the beginning.

Mangrove by Supersoft is a moderately interesting adaptation of the widely used "Game of Life". In this version, you begin with a stable grid of 32 cells in the centre of the screen. You can now move a flashing cursor around the screen, leaving a trail of cells behind you. If you can place the cells you create so that they each have four neighbours, then they will survive — otherwise they will quickly perish.

The catch is that "cancerous" cells appear from random directions. Whenever they touch one of your cells, it is destroyed and the grid disrupted. The only solution is to repair the damage, or catch and destroy the cancerous enemies before they do too much harm.

The game is difficult to play and addictive in the short term, but I suspect that the lack of variety would quickly pall, especially the monotonous graphics.

Tank Atak, also by Supersoft and written by B Cotton, is a simple implementation of the arcade tank warfare games. Most of the graphics are low resolution, but they are cleverly used and quite satisfying in practice, with one or two flying saucer sprites darting about the simple mountain backdrop to liven things up a little. For those who are addicted to the arcade game itself, it will come as a disappointment that it is not possible to actually move your own tank across the ground, only to turn it in the direction indicated by the crude direction finder. The use of colour and sound is good, if not spectacular.

I found *Tank Atak* far more enjoyable to play than *Mangrove*, if only because it's the kind of game that you can get the hang of very quickly and yet never completely master.

A fast accurate varied game

Centropods, by Rabbit and written by B and D Houck, is a fairly typical *Centipede* game, with the addition of a randomly moving fireball at the bottom of the screen which, if it touches your fire base, will destroy it.

The game represents a fairly disappointing use of the graphical abilities of the 64. The controls are leaden and seem relatively inaccurate. There are none of the touches which lift a game out of the ordinary. Indeed, so lacklustre is the presentation, that even when your fire base is destroyed, there is hardly any indication of what has happened.

Because the original *Centipede* idea is a good one, the game has its attractions, but all in all it's a pretty sad effort for a commercial game.

If *Centropods* is an example of how not to present a commercial game, *Gridrunner* stands as overwhelming proof that it is still the skill and flair of the programmer which creates a great game. The idea behind *Gridrunner* is, once again, the basic *Centipede* game, but there all comparison ends. This is a fast accurate varied game with a host of touches which make it at least as good as most of the games being played in arcades around the country.

In *Gridrunner*, written by Jeff Minter of Llamasoft, the *Centipede* idea is dressed up in a science fiction scenario that has you controlling a nifty little spaceship in a quest to rid Earth's solar power grids of invading alien droids (who just happen to join together and progress like a *Centipede*). The threats are numerous and constantly changing — the sound and graphics are quite superb. I've played it for hours and I'm still only learning, but boredom is months away.

If I have a reservation, it's simply that I question whether anyone has to charge £9 in order to make a good return on a game like this.

Attack of the Mutant Camels, also by Jeff Minter, is completely new to me. The basic theme is an attack by a convoy of armoured and mutated camels under the control of alien invaders. Your job is to take your incredibly manoeuvrable scout ship and pick them off, one by one, avoiding their cannons and 'smart' missiles. If you're too slow, then they will overrun the defences of your main base. If you succeed . . . well, you get some more camels.

When I first played this game, I found it one of the best I had ever come across, far more exciting than *Gridrunner*, for instance. Although I still admire the presentation of the game, it has palled on me a little, simply because it lacks a certain variety. That shouldn't detract, however, from a brilliant job of programming and presentation.

The game controls are superb, with a sense of motion in the control of your ship that I have seldom seen equalled. The graphics and sound are excellent, including a trip through hyperspace (in between frames of camels) which contributes nothing to the actual game but is a joy to behold. This is all-action arcade stuff of the best quality, not strong on tactics but then not everyone is looking for tactical games.

Motor Mania, by Software 64 and written by John A Fitzpatrick, is a prime example of a good game that could have been made even better on the 64.



The theme of the game is a simple driving test. You steer your car along a changing road sometimes speeding along a three-lane highway, sometimes edging along a dirt track. There are a number of very nice touches to the game, including an occasional police car which speeds across an intersection with its siren wailing just as you try to cross at full speed.

Obstacles come in the form of other cars, oil slicks, logs, broken glass and even avalanches. There are a variety of instruments, the car can be refuelled, tyres can be changed and there is a generator which will only keep the battery charged if you keep up a fair speed over the circuit as a whole. The circuit itself, though clearly built up but of a limited number of units, is nevertheless varied enough to keep your interest the whole time — and if it doesn't, that's another car mangled.

Though I enjoyed playing it, my basic objection is that too little use is made of the 64's graphical abilities. Your own car (and the others which appear from time to time) is a single colour sprite, shaped roughly like a racing car. Some of the obstacles are also sprites and fairly neatly done. Apart from that, however, the whole game relies on the 64's low resolution graphics set, a fact which becomes painfully obvious when you look at the instrument panel. A high resolution display throughout would have required more work, but I think the overall quality of the game would have merited the effort.

As simple *Pacman* type games go, *Pakakuda* from Rabbit Software is quite competent. The theme is one of a fish which has to clear a grid by eating smaller fish, all the while evading the octopus pursuers. When an electric eel is eaten the pursuers can be attacked for a short time. Having cleared the grid of fish, another grid presents itself.

Unfortunately, the grid and the moving objects are all frankly boring, making very little use of the 64's capabilities. No doubt there are *Pacman* addicts who will relish another addition to the family, but I doubt if many other buyers will play it more than a couple of times.

The idea on which Supersoft's *Kaktus* is based sounds fairly original to me. You are a gopher, defending a cactus plant from a swarm of marauding wasps and hornets who are trying to eat it. Threats consist of a deadly acid rain released by the swarm, a buzzard which bombs you with its eggs and a mole which tries to fill in your hole and trap you.

Boredom mixed with amazement

Unfortunately, the graphics are extremely dull, the controls are slow and one or two attempts at the game were sufficient, in my case at least, to bring on an acute case of boredom mixed with amazement that anyone should try and charge £9 20 for this.

For all those who are bored with arcade-style games but are fascinated by intelligent board games, *Renaissance* from Software 64 and distributed by Audiogenic is going to be a good buy. In reality it's a version of *Othello*, the simplified version of *Go* which became popular around 10 years ago.

This is an attractively put-together package, colourful, easy to use and providing a wide range of options such as setting up problems, changing colours in mid-game, withdrawing one or more moves and suggested moves if you're stuck. There are eight levels of play and the standard is high. *Othello* has always fascinated me but I never realised how badly I must play until this program took me to the cleaners.

My only reservations about the game are that there are one or two careless touches, like a flashing cursor which alternates between white and pale yellow and so hardly catches the eye on the board. The other problem is that of speed on the higher levels. In complex situations it can be a matter of sitting back and having a cup of coffee before a move is decided upon and a game at the highest levels is likely to take a considerable time. Even so this is a game that is likely to be on your list of favourites long after the average arcade game has been consigned to a box in the attic.

If *Othello* is fun, chess for many micro owners is the ultimate in games. Of the many chess programs around at the moment, *Grandmaster* from Software 64 appears to be one of the strongest (the strongest micro version according to the handbook).

Not being a chess professional I find their claim difficult to assess, but the program certainly appears to be stronger than Artic's *Spectrum Chess* which was my previous favourite. The display is clear, although the graphics are not the best I have seen. Moves, the level of analysis and a chess clock are displayed on the right of the screen.

Surprisingly, for what seems such a well-put-together package, there are one or two fairly standard features missing. It is not possible, for instance, to set *Grandmaster* up to analyse a chess problem or to swop colours in mid-game. Since the 64 is going to be around for some time, it is to be hoped that these features will be added in the not too distant future, especially if people are being expected to pay £18 for the package. ■

Firm	Program	Cost	Entertainment	Presentation	Value
Llamasoft	*Gridrunner*	£8 95	5	5	4
48 Mount Pleasant	*Attack of the*	£8 95	4	5	4
Tadley	*Mutant Camels*				
Hants RG26 6EN					
Rabbit	*Centropods*	£5 65	2	2	3
380 Station Road	*Pakakuda*	£5 68	3	2	3
Harrow					
Middlesex HA1 2DE					
Software 64	*Grandmaster*	£17.95	5	4	4
Distributed by	*Motor Mania*	£8 95	4	3	3
Audiogenic	*Renaissance*	£8 95	5	4	4
PO Box 88					
Reading					
Berks					
Supersoft	*Kaktus*	£9 20	2	2	1
Winchester House	*Mangrove*	£9 20	3	2	2
Canning Road	*Tank Atak*	£9 20	4	3	3
Wealdstone					
Harrow					
Middlesex HA3 7SJ					

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On the move with Vic

***Peter Bartley** shows how to move objects about the screen in the first of a six-part series for the Vic20*

OK so you ve bought your Vic20, taken it home, been suitably impressed with its powerful sound and graphics capabilities suitably unimpressed by the demonstration programe in the back of the manu at then set back and thought "What now? Perhaps you bought a few magazines tapped their programs in and zapped a few more meanies Satisfied? I nope not

Writing your *own* games is a very powerful way of improving your programming capabilities (believe it or not!) and can be an informative and enjoyable way to learn new techniques commands and tricks even, on your micro This series of articles introduces the newcomer to the 'ins and outs' of Vic computing with a few tips to keep the "old hands on their toes! For the moment we ll be concentrating on 'arcade-type' games only (that is, those concerning objects moving about the screen)

With the Vic, there are two ways to get objects on to the screen *Print* and *Poke* The Vic owner's manual states that for more sophisticated animation, *Poke* is the more suitable True But the ever-faithful *Print* can have its useful points Try the program in Figure 1 to enhance your text presentation

A quick explanation line 40 is probably causing a bit of headscratching Quite simply, all this is doing is setting register *B* to the number of characters in *A* minus the current value of the loop If *B* is greater than the number of spaces on the screen (22) then *B* is made equal to 22 (neatens up the display!)

So, for each step in the loop, it produces a successively shorter string length When these strings are printed over each other, in line 50, it produces the effect of movement

This simple program can have useful games applications If the loop was continuous and consisted of graphic logs and turtles you d have little further to go to produce a working version of *Frogger*!

Another useful *Print* routine producing a futuristic display is contained in Figure 2

Line 40 in Figure 2 chops up A$ into single characters and checks to see if the characters are spaces or not If the characters are not spaces, lines 60 and 70 make a noise and print the character If they are spaces, the characters are printed without the noise

Line 40 can also be used to filter out cursor commands as well as spaces How?

By the way, line 50 simply prints a cursor (*) over the current print position This novel routine would certainly liven up a bland "adventure program and generally illustrates the Vic s ability to chop up and mangle strings

On with the games! Presuming you have read the owners manual you will have some idea of how to *Poke* objects on to the screen I personally like to view the screen as two grids superimposed on each other — then one grid represents the shape of the character, and the other its colour

In this respect there are two 'magic numbers to remember (inscribe them on the tablets of your heart — they'll serve you well!) They are *7680* and *30720* The first you may recognise as the first screen location, the second will probably be unfamiliar You will notice that the first colour location is *38400* — and what s *38400* minus *7680*? Yes, you've guessed it! — *30720*

So, when you re moving objects about, you can colour them by simply adding *30720* to their screen character codes (*7680–8185*)

Suppose you want to move an object randomly about the screen, representing say a dodging aircraft or spaceship Obviously this involves use of the random number generator Being on a flat screen, our ship can only move in four directions (possibly eight if you include diagonals) From any given position it can move up (−22 blocks on the Vic screen), down (+22), left (−1), or right (+1)

At first sight, it looks impossible to produce just those numbers using *Rnd(1)* The easiest way to overcome this is

```
10 A(1) = 22 A(2) = −22 A(3) = 1 A(4) = −1
20 B = INT(RND(1) * 4) +1 PRINT A(B) GOTO 20
```

See? Much easier and neater than a sense of *If Thens* Delete line 20 and add the following

```
20 B = 7933 POKE 36879 8 PRINT [CLR SCRN]
30 POKE B 32 B = B + A(INT(RND(1) * 4) + 1)
   POKE B 81 FOR C = 1 TO 100 NEXT
40 GOTO 30
```

Well there s a start We re moving at last! Next week we ll be dealing with how to get your ship on the screen reacting to your inputs and fully exploring the realms of *Peek* and *Poke* Later still we ll be seeing how to vastly improve Vic standard graphics and play around a little with the sound generators

Meanwhile try to figure out a way to stop our friendly "blob" in the program above from disappearing off the top and bottom of the screen ■

VICTRICK No 1 Type in SYS64802 and see what happens!

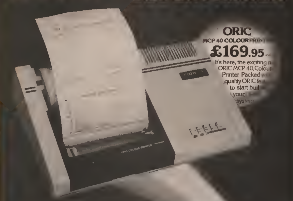
Figure 1

```
10 A$ = "[illegible] YOUR [illegible]
   HERE [illegible] E]"
20 FOR A = 1 TO LEN(A$)
30 PRINT [CSR HOME]
40 B = LEN(A$) − A + 1 IF B>22
   THEN B = 22
50 PRINT MID$(A$ A B)
60 FOR C = 1 TO 100 NEXT
70 NEXT
```

Figure 2

```
10 POKE [illegible] POKE [illegible]
   POKE 36879 15
20 A$ = "ANOTHER MESSAGE
   HERE (UPPER AND LOWER
   CASE)"
30 FOR A = 1 TO LEN(A$)
40 B$ = MID$(A$ A 1) IF B$ = "
   [SPACE]" THEN 70
50 PRINT "[RED] * [CSR BACK]
   [WHITE]"
60 POKE 36876 230 FOR B = 1 TO
   20 NEXT POKE 36876 0 FOR B
   = 1 TO 10 NEXT
70 PRINT B$; NEXT
```


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[illegible]

[illegible]

A flash of light

***Peter Vincent** explains how to invert the screen and switch both Flash and Bright on or off*

The three machine code routines presented here operate on the attribute file of the ZX Spectrum and hence alter the display instantly by a simple Usr call

The first two routines given in Figures 1 and 2, alter the *Flash* and *Brightness* attributes respectively This means that, if the relevant attribute was set to 1, it is changed to a 0 (ie ON to OFF), and if set to 0, then it is changed to 1 Consequently if the *Flash* routine is called then whatever was not *Flashing* now starts to *Flash* and anything that was *Flashing* now stops The *Brightness* routine works in exactly the same way

If you examine the detail of each routine you will see that the start of the attribute file is loaded into the *Hl* register pair, which is then incremented to examine each byte of the file in turn Then the *Flash* bit (bit 7) or the *Brightness* bit (bit 6) of each byte is tested and reset if set, or set if previously reset.

On each of the three routines given here, the count is organised in the same way The *B* register is initially set to 194 and this is decremented to 0, then reset to 255 (twice) by reference to the number stored in the *C* register This gives the 704 (194 + 255 + 255) items needed to make up the screen display

The third routine in Figure 3 performs a screen invert by exchanging all the *Paper* and *Ink* attributes the other attributes are not affected The routine works in a similar way to the earlier two but finds the relevant bits in the attribute file by masking each byte in turn with the instructions *And 7, And 56 And 192* (binary 00000111 (0h), 00111000 (38h) and 11000000 (C0h)) The attributes are then moved either left or right into the positions of the *Ink* or *Paper* they are about to become, and then stored in the *D* and *E* registers Finally, all the attribute byte is put together using the instructions *Or D* and *Or E* and replaced into the attribute file

The program in Figure 4 allows all three routines to be *Loaded* into memory, after storing the Hex data in a string Be sure to enter this string in the *Caps* mode, so that the *Hex Load* program given in lines 50 to 90 works correctly

When entered, each routine can be called using the appropriate *Usr* call with the routines stored as follows: the screen invert routine at address 32480 the flash routine at 32525, and the brightness routine at 32554 The program gives a demonstration of all three routines but they do not all have to be used together and any individual routine can easily be added when required to any machine code program ●

Figure 1

```
HexData   Op     Operands
210058    LD     HL,5800h
0E02      LD     C,02h
06C2      LD     B,C2h
CB7E      BIT    7,(HL)
2004      JR     NZ,+04h
CBFE      SET    7,(HL)
2802      JR     Z,+02h
CBBE      RES    7,(HL)
23        INC    HL
10F3      DJNZ   -0Dh
79        LD     A,C
FE00      CP     00h
C8        RET    Z
0D        DEC    C
06FF      LD     B,FFh
18EA      JR     -16h
```

Figure 2

```
HexData   Op     Operands
210058    LD     HL,5800h
0E02      LD     C,02h
06C2      LD     B,C2h
CB76      BIT    6,(HL)
2004      JR     NZ,+04h
CBF6      SET    6,(HL)
2802      JR     Z,+02h
CBB6      RES    6,(HL)
23        INC    HL
10F3      DJNZ   -0Dh
79        LD     A,C
FE00      CP     00h
C8        RET    Z
0D        DEC    C
06FF      LD     B,FFh
18EA      JR     -16h
```

Figure 3

```
HexData   Op     Operands
210058    LD     HL,5800h
0E02      LD     C,02h
06C2      LD     B,C2h
7E        LD     A,(HL)
E607      AND    07h
CB27      SLA    A
CB27      SLA    A
CB27      SLA    A
57        LD     D,A
7E        LD     A,(HL)
E638      AND    38h
CB3F      SRL    A
CB3F      SRL    A
CB3F      SRL    A
5F        LD     E,A
7E        LD     A,(HL)
E6C0      AND    C0h
B2        OR     A,D
B3        OR     A,E
77        LD     (HL),A
23        INC    HL
10E3      DJNZ   -1Dh
79        LD     A,C
FE00      CP     00h
C8        RET    Z
0D        DEC    C
06FF      LD     B,FFh
18DA      JR     -26h
```

Figure 4

```
  10 CLEAR 32479
  20 LET A$="2100580E0206C27EE60
7CB27CB27CB27577EE638CB3FCB3FCB3
F5F7EE6C0B2B3772310E379FE00C80D0
6FF18DA"  REM SCREEN INVERT
  30 LET A$=A$+"2100580E0206C2CB
7E2004CBFE2802CBBE2310F379FE00C8
0D06FF18EA"  REM FLASH INVERT
  40 LET A$=A$+"2100580E0206C2CB
762004CBF62802CBB62310F379FE00C8
0D06FF18EA"  REM BRIGHT INVERT
  50 LET X=32480
  60 LET V=16*(((CODE A$-48) AND
 CODE A$<58)+((CODE A$-55) AND CO
DE A$>64))+(((CODE A$(2)-48) AN
D CODE A$(2)<58)+((CODE A$(2)-55)
 AND CODE A$(2)>64))
  70 POKE X,V
  80 LET A$=A$(3 TO )
  90 IF A$<>"" THEN LET X=X+1: G
O TO 60
 100 FOR X=1 TO 704
 110 PRINT INK 5; PAPER 0;CHR$ (
RND*90+35)
 120 NEXT X
 130 REM SCREEN INVERT
 131 RANDOMIZE USR 32480
 140 PAUSE 100
 150 REM FLASH INVERT
 151 RANDOMIZE USR 32525
 160 PAUSE 100
 170 REM BRIGHT INVERT
 171 RANDOMIZE USR 32554
 180 PAUSE 100
 190 GO TO 130
```

Get the message

Brian Cadga provides an alternative set of error messages

Error messages given by the Dragon are somewhat terse to say the least. A question mark followed by two letters can be somewhat confusing and send you scurrying for your quick reference guide. What is worse, not all of the error codes are explained — *?DN* and *?UF* are two examples. For the less experienced user for whom error messages need to be especially clear, all this can be very confusing.

The accompanying program will, when entered and Run, replace the two letter codes with full text messages such as "*Out of string space*" instead of *?OS*. There are 26 possible error messages that the Dragon can produce and the new versions are held in the Data statements from lines 200 onwards. The order of these is very important to ensure that the correct message is displayed. However, the messages can say anything you like — they are as clear as possible, but you may like to alter the Data statements to give customised or comical messages instead (how about "*Major Cockup*" instead of "*Syntax error*")

The assembly language listing of the machine code shows how the program works with each line explained. When an error occurs, the Dragon jumps to location 401, which usually contains a *Rts* instruction. The program changes this to jump to the special error routine. The number of the error (from 0 to 25) is held in the *B* register, which must be divided by two to get the actual number — this is done in line 100 of the assembly language listing.

All of the Rom calls are explained in the listing, the most useful being the call to location 37093. This will print the text starting at the address one after that in the *X* register until a zero byte is encountered — this is why after each message a zero is *Poked* in line 120 of the Basic listing.

The machine code in the Data statements is checked in line 60 by means of a check sum and will not run if any errors are present — this avoids the machine crashing. To return to the normal Dragon error codes at any time, type *Poke 401 57* and to get full messages type *Poke 401,126*. ■

```
0  FULL ERROR MESSAGES
10 CLEAR 200 31999
20 FOR I=1 TO 62 READA$
30 DATA 3C 62 BC BC DC BD,
40 DATA 9E 7D 63 54 5D 27,07 A6 80 26
_7 8D
50 DATA 1F 12 8E 7D 5A BD 90,E5,1F 20,
60 IF CS<>7922 THEN PRINT DATA ERROR
70 B=32100 FOR I=0 TO 25
80 READA$
90 FOR J=1 TO LEN(A$)
100 POKE B ASC(MID$(A$, J,1)) B=B+1
110 NEXTJ
120 POKE B,0 B=B+1
130 NEXTI
140 POKE 32099 255
150 A$="B IN   FOR I=1 TO LEN(A$) POKE 3200
B9 0
160 POKE 402 125 POKE 403 0 POKE 401 126
200 DATA NEXT W/O FOR SYNTAX ERROR RETURN W
210 DATA ARITHMETIC OVERFLOW OUT OF MEMOR
IM'ED ARRAY"
220 DATA "CAN T DI IDE BY ZERO  ILLEGAL DIRECT
 STRING TOO LONG
230 DATA STRING TOO COMPLEX  CAN T CONTINUE  UNDEF
 ALREADY OPEN,ILLEGAL DEVICE # I O ERROR,WRONG FILE TYPE
240 DATA INPUT PAST EOF DIRECT STATEMENT
```

```
7D00                20      PRT
7D00 3262           30      LEAS 2,S
7D02 BDBDDC         40      JSR 47604   TURN OFF MOTOR
7D05 BD0AC3         50      JSR 47011   AUDIO OFF
7D08 BD9434         60      JSR 33644   TIDY UP STACK
7D0B 7F006F         70      CLR 111     CLEAR CHANNEL 0
7D0E BD90A5         80      JSR 37029   LINEFEED SCREEN
7D11 8E7D63         90      LDX #32099  START OF MESSAGES
7D14 54            100      LSRB        GET ERR # NUMBER
7D15 5D            110 @LOOP TSTB
7D16 2707          110      BEQ @PRT
7D18 A680          120      LDA ,X+
7D1A 26F3          120      BNE @LOOP
7D1C 5A            120      DECB
7D1D 20F6          130      BRA @LOOP   FIND CORRECT MESSAGE
7D1F 301F          140 @PRT LEAX -1
7D21 BD90E5        150      JSR 37093   PRINT MESSAGE
7D24 9E68          160      LDX 104     GET LINE NUMBER
7D26 8CFFFF        170      CMPX #65535 CHECK NO LINE
7D29 270D          180      BEQ @FIN
7D2B 1F12          190      TFR X
7D2D 8E7D5A        190      LDX #32090
7D30 BD90E5        200      JSR 37093
7D33 1F20          210      TFR Y D
7D35 BD957A        220      JSR 38266   PRINT LINE NUMBER
7D38 BD90A1        230 @FIN JSR 37025   LINEFEED SCREEN
7D3B 7E8371        240      JMP 33649   RETURN TO BASIC
                            END
```

Assembled – part five

***Jeremy Ruston** concludes his introduction to assembly language programming*

The *Php* instruction pushes the status register on to the stack. Apart from pushing it, this instruction does not affect the status register. This instruction is often used in the same way as the *Pha* instruction above.

The *Pla* instruction pulls the accumulator off the stack. Thus, it complements the *Pha* instruction.

The *Plp* instruction pulls a byte from the stack, then moves it into the status register. The flags are inherently affected. This instruction is usually paired with a *Php* instruction, to conserve the status register whilst a subroutine is executing.

The *Rol* instruction is similar to the *Asl* instruction. The difference is that when the byte is shifted left, bit zero is not set to zero — rather, it is set to the previous value of the carry flag. The instruction thus rotates the byte, and assumes that the carry flag is the 9th bit of the byte. The addressing modes allowed are:

Accumulator eg ROL A
Zero page eg ROL &83
Absolute eg ROL &8369
Zero page indexed with X eg ROL &83,X
Absolute indexed with X eg ROL &8369 X

The idea of this instruction in part is to allow the shifting of numbers that are more than eight bits long. For example, if a 32 bit number is stored in *&80–&83*, the following sequence of instructions will shift the whole lot one position to the left:

```
ASL &80
ROL &81
ROL &82
ROL &10
```

In addition to the action of the carry flag mentioned earlier, the sign and zero flags are affected in the normal way.

The *Ror* instruction is similar to the *Rol* instruction, except that the rotation is carried out to the right. Exactly the same addressing options can be used.

The *Rti* instruction is like the Basic keyword *Return*, except that it is not used to return from a normal subroutine. Rather it is used to exit from a subroutine designed to deal with interrupts. Thus, you'll almost certainly never have to use this instruction.

Internally, it pulls the status register off the stack, then pulls the new program counter contents off the stack. Thus it pulls off the stack exactly what the *Brk* instruction put there. You could use the *Rti* instruction to effect return from a normal subroutine as follows:

```
<main_program>
JSR <label>
<rest of program>

 <label>
PHP
<subroutine code<
RTI
```

In this case, you are substituting *Rti* for the code *Plp, Rts*.

The *Rts* instruction is used like the *Return* keyword of Basic. It pulls the program counter off the stack, where it was placed by the *Jsr* instruction. Subroutines are described under the description of the *Jsr* instruction.

The *Sbc* instruction subtracts the contents of the indicated memory location from the accumulator. However, like the *Adc* instruction, it also takes the contents of the carry flag into account. If the carry flag is set, it is ignored, otherwise 1 is subtracted from the final answer.

Thus, the *Sbc* instruction is often preceded by an *Sec* instruction (SEt Carry flag) to ensure that the carry flag does not muck up the result. Like the *Adc* instruction, bit 8 of the accumulator is assumed to be the carry flag, so if a borrow is necessary (as in 3-5) the carry flag is set.

In keeping with the way the carry flag is treated at the start of the instruction, it is inverted after the instruction. This means that the carry flag will be unset if a borrow was required, and set if it was not.

The *Sbc* instruction can use the same addressing modes as the *Adc* instruction.

Multiple *Sbc* instructions can be concatenated in the same way as multiple *Adc* instructions. Besides the carry flag, the sign and zero flags are affected in the normal way by this instruction.

The *Sec* instruction sets the carry flag, while the *Sed* instruction sets the decimal mode flag. This makes the computer carry out decimal arithmetic until the next *Cld* instruction.

The *Sei* instruction sets the interrupt disable flag, so disabling interrupts. You can use this instruction in particularly crucial bits of code, to ensure that the processor is not interrupted. If you do, you should push the old status value beforehand, and retrieve it afterwards. This ensures that interrupts are treated the same before and after the routine executes.

The *Sta* instruction stores that value of the accumulator to the indicated location. It can use all the *Adc* addressing modes except the immediate addressing mode — which wouldn't make any sense in this instruction anyway. Thus, *Sta &2000* stores the value in the accumulator to location *&2000*.

The *Stx* instruction does the same thing as the *Sta* instruction, except it stores the value in the *X* register. The addressing modes allowed are:

Zero page eg STX &80
Absolute eg STX &7C80
Zero page indexed with Y eg STX &80 Y

Naturally, no flags are affected by this instruction.

The *Sty* instruction stores the value of the *Y* register to a specified memory location. The addressing modes allowed are:

Zero page eg STY &75
Absolute eg STY &7500
Zero page indexed with X eg STY &75,X

The *Tax* instruction transfers the value in the accumulator to the *X* register. In the process, the sign and zero flags are affected.

The *Tay* instruction transfers the value in the accumulator to the *Y* register. In the process, the sign and zero flags are affected in the normal way.

The *Tsx* instruction transfers the current value of the stack pointer to the *X* register. It is the only way to examine the contents of the stack pointer. This instruction is used by the operating system to access information passed on the stack, but normal programming rarely uses it. The sign and zero flags are affected in the normal way.

The *Txa* instruction transfers the contents of the *X* register to the accumulator, affecting the sign and zero flags as it does so.

The *Txs* instruction copies the *X* register to the stack pointer, without affecting any flags. It is the normal way to set the stack pointer when the computer is reset. Otherwise, it is rarely used.

The *Tya* instruction copies the value held in the *Y* register to the accumulator, affecting the sign and zero flags in the normal way as it does so. ■

This is an extract from *The BBC Micro Compendium* available from 1 August, from Interface Publications, 44-46 Earls Court Road, London W8 6EJ.


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Modules 5 – 9

Module 1.5

Although it is more sensible to input numbers in hexadecimal, working in Basic does mean that they have to be translated into ordinary decimal for use by the program. This is accomplished by the current module.

Commentary

Throughout the program the variable *Err* (error) will be used to indicate that an error has been discovered. The normal value of *Err* will be 0, which is the value assigned to the variable *False* in the initialisation routine. Whenever an error is detected, *Err* is reset to the value of *True*, which is minus one.

The point behind using these truth values is that it also allows *Err* to be set by a statement such as *Err=(A>50)*. The expression in brackets has a value according to whether it is true or false. If false, it will take the value 0. If true it will have the value −1. By this means *Err* can be set to show that something is wrong much more economically than using statements such as *If A>50 Then Err=−1*

Examining each character of the string *H$* in turn, this loop 11980-12020 extracts the decimal value of the hexadecimal character using the user-defined function *Fndec* (line 10050). Since the loop works from the left, the result obtained so far must be multiplied by 16 for each subsequent hexadecimal digit. If a character outside the range 0-F is input, the *Err* variable is set to −1 as a warning to subsequent modules.

Module 1.6

When printing the contents of an area of memory to the screen, it is necessary to specify the start point in memory. This is done in hexadecimal and the input is then translated into decimal by the previous module.

Module 1.7

When an area of memory is dumped to the screen, this module is called to inquire whether the user wishes to continue with another.

Module 1.8

This module does the actual work of taking a value from a location in the memory specified by the Variable *AD*. Module 2 is then called to transform the value into hexadecimal form — single figure hexadecimal numbers are padded out with a leading zero in order to ensure a standardised format of two digits per byte of memory. Finally the hexadecimal number is added to O2$, which will be used to display the contents of the memory to the screen.

Module 1.9

We have now entered all the modules which are necessary to define a start address and pick up data from the memory. We can now proceed to the part of the program which actually does something. Having defined the start point, this module prints out the contents of an area of memory to the screen.

Commentary

The *X1* loop will be used to print out 18 lines, each with eight values taken from the memory, starting at the address now stored in *AD*.

The hexadecimal values returned by the previous modules are stored in the string *O2$*. If the value contained in the particular memory location is the code of an Ascii letter or digit, that character is stored in the string *O3$* for display next to the values concerned. In most cases, the characters displayed will make no sense, since the fact that the code is that of a printable character will be purely chance. However, when examining areas of memory such as the variables area of the 64, or the structure of the Basic program itself, or a machine code program which contains strings, this facility will be indispensable in getting a picture of what an area of memory contains.

Review

Having entered this section, you have the working basis of the program as a whole. In the sections which follow you will find that many of the modules employed have already been entered, since functions such as translating into hexadecimal are common to them all.

Before moving on to enter the rest of the program, familiarise yourself with the operation of the program so far. Examine the area of memory which contains the start of the program itself (starting at 801 hex) and the variables area. ■

This is an extract from *Commodore 64 Machine Code Master* by David Lawrence and Mark England, published by Sunshine Books.

```
MODULE 1.5
11900 [illegible]
11901 REM [illegible]
11902 REM[illegible]
11975 ERR = [illegible]
 THEN 12030
11980 FOR I = 1 [illegible]
11990 T = FNDEC([illegible]
H=H*16+T
12010 IF T>9 [illegible]
12020 NEXT I
12030 RETURN
READY
```

```
MODULE 1.6
12050 REM********************************
12051 REM INPUT START ADDRESS
12052 REM********************************
12057 H$ = ""
12060 INPUT "START ADDRESS ( IN HEX ) ";
";H$ : GOSUB 11950
12080 IF ERR OR H<0 OR H>65535 THEN 1205
0
12090 AD = H : RETURN
```

```
MODULE 1.7
11850 REM********************************
11851 REM ASK CONTINUE ?
11852 REM********************************
11858 T$ = ""
11860 INPUT "CONTINUE ( Y/N ) ";T$
11870 IF T$="Y" THEN CO = TRUE : GOTO 11
895
11880 IF T$<>"N" THEN PRINT "{CU}"; : GO
TO 11850
11890 CO = FALSE
11895 RETURN
```

```
MODULE 1.8
11100 REM********************************
11101 REM BYTE [illegible]
11102 REM********************************
11110 H = PEEK(AD) : AD = [illegible]
11120 GOSUB 11000
11130 IF LEN(H$)<2 THEN H$ = [illegible]
11140 O2$ = O2$+H$
11150 RETURN
```

```
MODULE 1.9
13300 REM********************************
13301 REM DUMP MEMORY TO SCREEN
13302 REM********************************
13310 GOSUB 12050
13320 PRINT "{CLR}" ; FOR X1 = 1 TO 18 :
 H = AD : GOSUB 11800
13340 O2$ = "" : O1$ = H$ : O3$ = ""
13350 FOR X2 = 0 TO 7
13360 GOSUB 11100 : O2$ = O2$+" "
13375 IF H>31 AND H<95 THEN O3$ = O3$+CH
R$(H) : GOTO 13380
13377 O3$ = O3$+"."
13380 NEXT X2
13390 PRINT O1$ TAB(5) O2$ TAB(31) O3$
13400 NEXT X1
13410 PRINT : GOSUB 11850 : IF CO THEN 1
3320
13440 RETURN
```



OPEN FORUM

***Open Forum* is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the *Program of the Week* double our new fee of £6 for each program published**

Function

on Dragon

This program has been written on a Dragon 32 but can easily be modified for use on any micro. The program solves the function in line 60 which is entered as: for an example

60 DEF FN F(X) = X*X−(1−X)↑5"

The program expects exactly one root to be located between the lower and upper limits supplied by the user, with the function having opposite signs at each limit. The user should also supply the accuracy required (1E-8 is suitable) and can see the interval A to B being diminished as the iteration proceeds. For very fast iteration a small interval should be used.

Program notes

60	Function introduced here
90-130	Introduce limits and accuracy
140	Enter subroutine for solution
150	Print root
500-590	Iteration subroutine executed until tolerance of line 590 is satisfied

Variables

A,B	Limits of interval
W	Next computed value to be considered
FA,FB,FW	Corresponding function value
T	Tolerance (accuracy of function value)

```
10 REM SOLUTION OF F(X)=0
20 REM USING THE METHOD OF FALSE POSITION
30 REM
40 REM
50 REM INTRODUCE FUNCTION IN LINE 60
60 DEFFN F(X)=
70 REM
80 CLS
90 PRINT"SOLUTION OF F(X)=0":PRINT
100 INPUT"LOWER LIMIT";A
110 INPUT"UPPER LIMIT";B
120 IF A>=B THEN 100
130 INPUT"ACCURACY OF SOLUTION REQUIRED";T
140 GOSUB 500
150 PRINT:PRINT"APPROXIMATE ROOT=";W
160 STOP

500 FA=FNF(A): FB=FNF(B)
510 IF FA*FB>0 THEN PRINT"METHOD UNSUITABLE FOR LIMITS GIVEN": STOP
520 CLS: PRINT"A","B":PRINT
530 PRINT A,B
550 W=(FB*A-FA*B)/(FB-FA)
560 FW=FNF(W)
570 IF FA*FW<0 THEN B=W: FB=FW: GOTO 590
580 A=W: FA=FW
590 IF ABS(FW)<T THEN RETURN ELSE 530
```

Function
by David Prine

Tank Patrol

on Vic20

Can you return to the HQ in as quick a time as possible without being blown up by an anti-tank mine? The program runs on the unexpanded machine.

Program notes

Lines	
101	Sets variables
120-128	Draw buildings and HQ
131-134	Lay mines
136	Data for tank
201-267	Movement routine
3000	Instructions

```
1 TI$="000000"
10 GOSUB3000
100 REM****VARAILES**
101 A=7680 B=38400 C=36878 D=36876 E=
    7725 F=38445 V=30720 P=7725 O=38445
    I=7725 L=36845
103 S=7680 K=38400
120 PRINT"J" GOSUB131
121 PRINT"■■■■■■"
122 FORU=1TO2
123 Z=INT(RND(1)*500)
124 POKEA+Z,230
125 POKEB+Z,0
126 GOTO130
127 NEXT
128 PRINT"■■■■■■■■■■■■■■■■■■■■■■■■■
    ■■■■■■■■■■■■■■<" PRINT"■■■■HU PRINT
    "■■■
129 GOTO135
130 POKED,INT(RND(1)*128)+128 FORN=1TO5
    NEXTN GOTO127
131 FORH=1TO10 W=INT(RND(1)*500)
132 POKES+W,162
133 POKEK+W,1 NEXT
134 RETURN
135 REM****TANK*****
136 FORT=1TO8 READC POKE7176+T,C NEXT
138 DATA135,195,189,189,189,203 203,203
139 POKE36869,255
140 POKEP 1 POKEQ,1 POKEP+Q,B
200 REM*****
201 GETA$ IFA$=""THEN201
202 IFA$="■"THENO=1
203 IFA$="■"THENX=X-22 Y=Y-22 Q=2 REM*DOWN*
204 IFA$="■"THENX=X-1 Y=Y-1 Q=3 REM*LEFT*
205 IFA$="C"THENX=X+1 Y=Y+1 Q=4 REM*RIGHT*
206 IFA$=" "THEN900 REM*FIRE*
207 IFQ=0THEN201
208 ONQGOSUB250,260,270,280
210 IFPEEK(8140)=1THEN5000
211 IFPEEK(8141)=1THEN6000
212 IFPEEK(8140)=1THEN6000
213 IFPEEK(8117)=1THEN6000
214 IFPEEK(8095)=1THEN6000
215 IFPEEK(8096)=1THEN6000
216 IFPEEK(8097)=1THEN6000
240 GOTO201
```

```
250 IFPEEK(E+22)=230ORPEEK(E+22)=163THE
    NO=1 GOSUB400 RETURN
251 POKEE,32 F=F+22 E=E+22 POKEF,1
252 POKEE,1 POKEF,0 RETURN
260 IFPEEK(E-22)=230ORPEEK(E-22)=163
    THENO=1 GOSUB400 RETURN
261 POKEE,32 E=E-22 F=F-22
262 POKEE,1 POKEF 0 RETURN
270 IFPEEK(E-1)=230ORPEEK(E-1)=163THENO=1
    GOSUB400 RETURN
271 POKEE,32 E=E-1 F=F-1 GOTO307
280 IFPEEK(E+1)=230ORPEEK(E+1)=163THENO=1
    GOSUB400 RETURN
281 POKEE,32 E=E+1 F=F+1 GOTO307
307 POKEE,1 POKEF,0 RETURN
400 POKE36877,220 FORL=15TO0STEP-1
    POKE36878,L
401 FORM=1TO50 NEXTM NEXTL
402 POKE36877 0 POKE36878,0
403 IFO=1THEN6000
404 RETURN
443 IFO=1THEN6000
450 RETURN
3000 PRINT"" POKE36869,240
3001 POKE36879,26
3002 PRINT"            TANK    "
3003 PRINT"                   "
3004 PRINT"           PATROL  "
3005 PRINT"                   "
3006 FORX=1TO1000 NEXTX
3007 PRINT"" POKE36879,29
3008 PRINT"   TANK    PATROL    "
3009 PRINT"YOU ARE ON A ROUTINE   PATROL
     IN THE MIDDLE OF A TOWN."
3010 PRINT"YOU ARE ATTACKED AND  YOU LOOSE
     YOUR WAY."
3020 PRINT"YOU ARE THEN CONTACTED TO
     RETURN TO HQ TO   REENFORCE IT."
3030 PRINT"AGAINST AN ATTACK"
3040 PRINT"YOU MUST RETURN AT    SPEED."
3050 PRINT"CAN YOU SAVE THE HQ!"
3051 PRINT"WATCH OUT FOR THE      MINES"
3052 PRINT"YOU HAVE NO AMMUNITION"
3060 PRINT"--HIT A KEY--"
3061 GETA$ IFA$=""THEN3061
3062 PRINT"<<<<<<CONTROLS
3063 PRINT"F -----TANK FU
3064 PRINT"F1 -----TANK RE L
3065 PRINT" -----TANK LEFT"
3066 PRINT" -----TANK RIGHT"
3068 PRINT"PLEASE PRESS THE SPACE
3069 GETA$ IFA$<>" "THEN3069
3080 PRINT"" POKE36879,31
3081 PRINT"1. VILLAGE"
3082 PRINT"2. SMALL TOWN"
3083 PRINT"3. LARGE TOWN"
3084 PRINT"4. CITY"
3085 PRINT"5. LARGE CITY"
3086 PRINT"6. CONURBATION"
3087 PRINT"7. MEGALOPOLIS"
3090 INPUT"INPUT AREA TYPE",QQ
3091 IFQQ=1THENZ=10
3092 IFQQ=2THENZ=20
3093 IFQQ=3THENZ=30
3094 IFQQ=4THENZ=45
3095 IFQQ=5THENZ=50
3096 IFQQ=6THENZ=80
3097 IFQQ=7THENZ=100
3098 RETURN
5000 POKE36869,240 PRINT""
5001 PRINT"W E L L  D O N E !!!  "
5002 PRINT"YOUR TIME IS ",TI$
5008 PRINT"ANOTHER GO (Y/N)"
5010 GETS$ IFS$=""THEN5010
5011 IFS$="Y"THENRUN
5012 IFS$="N"THENEND
6000 PRINT"" POKE36869,248
6001 PRINT"B A D  L U C K  !!!!!"
6002 PRINT"YOU WERE BLOWN UP,TRYING TO"
6003 PRINT"GET TO THE HQ"
6010 GOTO5008
```

Tank Patrol
by Mark Manns

Chopper

on BBC Micro

Chopper is a game where you the tree feller have to rid the forest of dead trees. You score one point for each of the trees felled — but beware, you must avoid hitting the live trees as you will lose one of your five lives.

The program has many sound effects including a "reward" tune if you beat the high score, two colour user defined characters, a sound on or off routine and full instructions.

The higher your score the faster the game goes — utilising the negative inkey function means you can move either up and down, left and right or if two keys are pressed together, diagonally.

Program notes

20-160	Sets up sound/high score and instructions
170-260	Main program loop
280-350	PROCinit user defined Chr$
370-660	PROCscreen prints screen display
670-810	PROCmove moves man
820-880	PROCchange-direction
900-960	PROCprint score
970-1080	PROCloss deducts life crash sound flash screen
1090-1220	PROCend all lives lost update last score
1230-1470	PROCinstructions
1480-1580	PROC... the winning tune if score>beat

PROGRAM OF THE WEEK

```
20 REM ****************************
30 REM **CHOPPER*BY*J.R HARNETT*****
40 REM ****************************
50 REM *********JUNE*1983**********
60 REM ****************************
100 ON ERROR RUN
110 MODE 7
120 vol=-15 envel-126
130 PROCinstructions
140 beat=0
150 MODE 1
160
170REM****************************
180 PROCinit
190 REPEAT
200 PROCscreen
210 REPEAT
220 PROCmove
230 UNTIL lives
240 PROCend
250 UNTIL FALSE
260
270REM ****************************
280 DEF PROCinit
290 delay% 500 X% 0 ...
es-5
300 VDU 23,240,12,100,36,60,4,26,
310 VDU 23,241,0,0,32,34,20,0,0,0
320 VDU 23,242,0,28,62,62,28,0,0,0
330 VDU 19,1,14,0,0,0 VDU 19,2,5,0,0,0
VDU 19,3,2,0,0,0.REM 1 flash cyan red
magneta 3-green
340 COLOUR 2 X% 20:Y%=8
350 ENDPROC
```

```
360
370REM ******************************
380 DEF PROCscreen
390 CLS
400 ENVELOPE 2,5,4,-12,1,25,6,93,21,-4
,-3,-1,envel,envel
410 SOUND 1,2,71,5
420 PRINT:FOR N%=1 TO 30:PRINT TAB(1)
STRING$(38,CHR$(241));:NEXT
430 VDU 5:GCOL 0,3
440 MOVE 32,988:PRINT STRING$(38,CHR$(
242))
450 FOR N% 988 TO 60 STEP -32
460 MOVE 32,N%:PRINT CHR$(242):MOVE 12
18,N%:PRINT CHR$(242)
470 NEXT
480 MOVE 32,60:PRINT STRING$(38,CHR$(2
42))
490 MOVE 384,636:PRINT STRING$(18,CHR$
(242))
500 FOR N%=604 TO 422 STEP -32
510 MOVE 384,N%:PRINT CHR$(242):MOVE 8
64,N%:PRINT CHR$(242)
520 NEXT
530 MOVE 384,418:PRINT STRING$(18,CHR$
(242))
540 FOR N%=1 TO 60
550 MOVE RND(37)*32+32,RND(30)*32+28:P
RINT CHR$(242)
560 NEXT
570 VDU 4
580 REM curser off
590 VDU 23,1,0,0,0,0;
600 FOR N%=13 TO 18:PRINT TAB(13,N%)SP
C(14):NEXT
610 COLOUR 1
620 PRINT TAB(15,14)"SCORE     ";score T
AB(15,18)"LIVES   ",STRING$(lives,CHR$(24
0))
630 PRINT TAB(15,16)"BEST  "TAB(23,16);
best
640 PRINT TAB(X%,Y%)" "
650 ENDPROC
660
670REM ******************************
680 DEF PROCmove
690 FOR N=1 TO delay%:NEXT
700 z%=INKEY(-98):x%=INKEY(-67):m%=INK
EY(-102):k%=INKEY(-71)
710 IF INKEY(-17) THEN vel=0:envel=0
720 IF INKEY(-82) THEN vel=-15:envel=1
28
730 IF z% OR x% OR m% OR k% THEN PROCc
hange_direction
740 pointx%=(X%+XX%)*32+16:pointy%=(31
-Y%-YY%)*32+28
750 IF POINT(pointx%,pointy%)=3 THEN P
ROClose_life:ENDPROC
760 IF POINT(pointx%,pointy%-12)=2 THE
N PROCprint_score ELSE SOUND 0,-5,4,1:AN
D vel=-15
770 PRINT TAB(X%,Y%)
780 X%=X%+XX%:Y%=Y%+YY%
790 PRINT TAB(X%,Y%)CHR$(240)
800 ENDPROC
810
820REM ******************************
830 DEF PROCchange_direction
840 IF z% AND x% OR m% AND k% THEN END
PROC
850 XX%=1*z%-1*x%:YY%=-1*m%+1*k%
860 *FX15,1
870 ENDPROC
880
890REM ******************************
900 DEF PROCprint_score
910 SOUND 0,vel,4,1:SOUND 2,8,4,1
920 score=score+1
930 PRINT TAB(23,14);score
940 delay%=delay%-1
950 ENDPROC
960
970REM ******************************
980 DEF PROClose_life
990 ENVELOPE 1,1,3,-8,16,6,6,7,15,-1,-
1,-5,envel,envel
1000 SOUND 1,1,55,25
1010 FOR N%=1 TO 4
1020 FOR M%=1 TO 8:VDU 19,2,M%,0,0,0:FO
R I%=1 TO 50:NEXT:NEXT
1030 NEXT:VDU 19,2,5,0,0,0
1040 lives=lives-1
1050 PRINT TAB(22,18);STRING$(lives,CHR
$(240));
1060 XX%=0:YY%=0
1070 ENDPROC
1080
1090REM ******************************
1100 DEF PROCend
1110 FOR M%=1 TO 3
1120 FOR N%=0 TO 13
1130 VDU 19,M%,N%,0,0,0
1140 FOR I%=1 TO 400:NEXT:NEXT
1150 IF score>best THEN best=score:PROC
tune
1160 NEXT:PROCinit
1170 REPEAT
1180 PRINT TAB(5,28)"Do you want to pla
y again Y/N";:A$=GET$
1190 UNTIL A$="Y" OR A$="N"
1200 IF A$="Y" THEN ENDPROC ELSE CLS:PR
INT TAB(5,10)"THANKS FOR PLAYING  MUGS!"
1210 END
1220
1230REM ******************************
1240 DEF PROCinstructions
1250 REM cursor off
1260 VDU 23,1,0,0,0,0;
1270 PRINT TAB(10,1) CHR$(141)CHR$(132)
"C H O"CHR$(130)"P P"CHR$(132)"E R"
1280 PRINT TAB(10,2) CHR$(141)CHR$(132)
"C H O"CHR$(133)"P P"CHR$(132)"E R"
1290 PRINT '"  Chop down as many dead t
rees as possible. Hitting one of the hea
lthy green trees loses you one life.    Y
ou score one for each dead tree felled an
d start with     five lives- "
1300 PRINT "Funny but the more trees yo
u fell the quicker you move."
1310 PRINT '"  USE "CHR$(129)"Z "CHR$(130)"
to move left,
```

continued over the page

```
1320 PRINT TAB(3)CHR$(129)'X CHR$(130)
o move r gh',
1330 PRINT TAB(3)CHR$(129) M CHR$(130)
to move down,
1340 PRINT TAB(3)CHR$(129) K'CHR$(130)'
o move up
1350 PRINTTAB(3)CHR$(129) Q CHR$(130) t
urn sound off
1360 PRINTTAB(3)CHR$(129) S'CHR$(130) t
urn sound on
1370 PRINT TAB(3)CHR$(129)'escape CHR$(
130) to return to menu and TAB(10)CHR$(1
30) reset scores'
1380 PRINT TAB(25,18) SOUND CHR$(132)
1390 PRINT TAB(6,21)CHR$(134) # Try mov
ng diagonally #
1400 PRINT TAB(7,24)CHR$(136) Press spa
ce bar to play
1410 REPEAT
1420 IF INKEY(-17) THEN vol 0 envel=0
1430 IF INKEY(-82) THEN vol=-15 envel=1
28
1440 IF vol=0 THEN PRINT TAB(31,15)'OFF
 ELSE PRINT TAB(31,15) ON '
1450 UNTIL INKEY( 99)=TRUE
1460 ENDPROC
1470
1480REM *****************************
1490 DEF PROCtune
1500 RESTORE
1510 FOR N=1 TO 19
1520 READ note,duration
1530 SOUND 2,vol,note,duration-2
1540 SOUND 3,vol,note 48,duration
1550 SOUND 2,0,0,3
1560 SOUND 3,0,0,1
1570 NEXT
1580 DATA 81,5,101,3,101,3,109,3,117,3,
109,3,101,3,97,3,89,8,89,8,109,15,109,4,
97,6,97,6,109,8,109,6,101,6,117,8,101,15

1590 ENDPROC
>
```

Chopper
by J Harnett

Atomic Collision

on Vic20

The program is an Atomic collision simulation and displays a radioactive source which gives off radiation. Other atoms are shown randomly scattered throughout the screen and should a stray particle hit one of these it splits into two smaller particles which scatter in different directions.

The program features sound as the radioactive source emits particles and when a collision occurs.

Variables

PO = position of emitted particle
PX and PY = positions of scattered particles
SY = shape of scattered particles

Finally PS, X, Y SX are random controls for positioning, sound frequency, etc

```
1 PRINT"ATOMIC COLLISION        SIMULATION"
3 PRINT"
4 FORT=1TO2000 NEXTT
10 S=36875 S1=36877 CO=38720
20 POKES,0
30 POKE36878,5
40 PRINT"J"
50 FORB=1TO10
60 PB=INT(RND(1)*505)+7680
70 POKEPB,160 POKEPB+CO,4
80 NEXTB
90 FORTY=1TO8
100 PO=7932
110 X=INT(RND(1)*5)+1
120 Y=INT(RND(1)*5)+1
130 POKES,245
140 FORRP=1TO13
150 POKE7932 81 POKE7932+CO,0
160 IFX>YTHENPO=PO-(X+18) POKEPO+(X+18),32
170 IFY>XTHENPO=PO+(Y+18) POKEPO-(Y+18),32
180 IFX=YTHEN110
190 IFPEEK(PO)=160THEN270
200 POKEPO,43 POKEPO+CO,2
210 FORT=1TO10
220 POKES,0
230 NEXTT
240 NEXTRP
250 NEXTTY
260 RUN10
270 POKES 0 PX=PO:PY=PO
280 FOREX=1TO20
285 SX=INT(RND(1)*127)+128
290 IFY>XTHENPX=PX-(X+18)-1 PY=PY-(Y+18)-1 POKEPX+(X+18)+1,32 POKEPY+(Y+18)+1,32
SY=62
300 IFX>YTHENPX=PX+(Y+18)+1 PY=PY+(Y+18)+1 POKEPX-(Y+18)-1,32 POKEPY-(Y+18)-1,32
SY=62
308 POKES1,SX
310 POKEPX,SY POKEPX+CO,6
320 POKEPY,SY POKEPY+CO,5
325 POKES1,0
330 FORT=1TO10
340 NEXTT
350 NEXTEX
360 FORT=1TO1200 NEXTT RUN10
```

Atomic Collision
by Richard Baton

Extra Colours

on Dragon

The high resolution screen of the Dragon is normally restricted to four colours per mode

Here are two short listings that will produce a multitude of colours and shades. By poking a value between 0-225 into each screen location, colours not obtainable by normal methods are revealed

Each pixel is composed of four parts. With the exception of 0 (which will only produce the mode background colour), between 1 and 4 parts of the pixel will be turned on in a mixture of colours (see Table 1)

Certain values will set all four parts of the pixel to the same colour (see Table 2). With a little skill these extra colours and pixels can be incorporated into your programs

The two listings take some one-and-a half hours to run through completely. You may wish to speed it up by adding *Poke 65495 0* at the beginning of the listing

Listing 1 will produce a wide variety of deckchair-striped patterns

Listing 2 produces an endlessly changing mosaic pattern

Listing 1

```
10 PMODE 1  SCREEN 1 0  PCLS
20 A = 0
30 FOR I = 1536 to 4607
40 POKE I A
50 NEXT I
60 A = A - 1
70 IF A > 256 THEN 90
80 GO TO 30
90 A = 0
100 PMODE 1  SCREEN1 1  PCLS
110 GO TO 30
```

Listing 2

```
10 A = 0
20 B = 15
30 PMODE 1  SCREEN 1 1  PCLS
40 FOR I = 1536 to 4607
50 POKE I A + B
60 A = A + 16
70 IF A > 239 THEN A = 0
80 NEXT I
90 B = B + 1
100 IF B > 15 THEN B = 0
110 GO TO 40
```

Table 1

background colour

= Pixel on

Table 2 Extra Colours in P MODE 1 and 3

SCREEN 1,0		SCREEN 1,1	
187	Purple	85	Green
238	Mauve	102	Blue
255	Wine	119	Old Gold
		153	Blue/Grey
		170	Purple
		187	Pink
		191	Dark Orange
		221	Olive Green
		235	Red/Pink
		238	Deep pink

Extra Colours
by A Massing

Currency

on Spectrum

This program will convert any currency in the world into sterling. Although it was written on the Spectrum it could easily be converted to most other micros

```
10 PRINT "Money Conversion"
15 PAUSE 100
17 CLS
20 INPUT "How much is there to
the £?",z
30 INPUT "How much do you want
converting?";a
35 LET r=(a/z)
40 PRINT "You paid £",r
50 PRINT "Another one? (Y or N
)"
60 IF INKEY$="y" OR INKEY$="Y"
THEN GO TO 30
70 IF INKEY$="n" OR INKEY$="N"
THEN GO TO 85
80 GO TO 60
85 PRINT "Would you like to pr
int thee     on the printer?"
90 IF INKEY$="y" OR INKEY$="Y"
THEN COPY
95 GO TO 90
100 IF INKEY$="n" OR INKEY$="N"
THEN STOP
110 GO TO 90
```

Currency
by R Stacey


at the sign of the BIG 'M'
MICRO MANAGEMENT
LOW
prices
BEST
service
OVER 1000
SOFTWARE TITLES AVAILABLE FOR BBC
SEND FOR LIST

Robot Race

on Spectrum

This is a race against time type of game. You must guide your robot around the screen picking up the blue rockets which your home planet needs for some mysterious reason. You get one point per rocket.

Program notes

2-5	Sets up variables and screen
15-67	Print Mothership, Robot and Rockets
68-150	Move Robot, test if he has hit anything
151-130	Check hi score and start new sheet
500-529	Ask user if he wants another go
800-5012	User graphics
5015-end	Instructions

Graphic notes

29 Graphic CDE
25 Graphic CDE
35 Graphic AB
40 Graphic A
55 Graphic CDE
56 Graphic G

```
2 LET HI=0: GO SUB 5000
3 LET T=250: LET SC=0
5 INK 0: PAPER 7: BORDER 2: [illegible]
10 BEEP [illegible]
15 FOR [illegible] TO 13 STEP 1
20 PRINT AT 1,A; [illegible] AT 1,A+2; INK RND*6 [illegible] BEEP .01,20+RND*[illegible]
[illegible]
30 FOR A=2 TO [illegible] 10
[illegible]
40 PRINT AT [illegible]
50 FOR B=A TO 3 STEP [illegible]
[illegible] INK RND*6 [illegible] BEEP .01,10: PRINT AT 1,B [illegible] NEXT B
60 FOR [illegible]=1 TO N: PRINT AT RND*[illegible]
[illegible]
65 FOR V=1 TO N-3
66 PRINT AT RND*20,RND*20; INK 1; FLASH 1; A [illegible] BEEP .001,50: NEXT V
67 PRINT AT [illegible]
68 LET [illegible]: LET [illegible]
[illegible]
80 IF INKEY$="8" AND X<31 THEN PRINT AT X,Y [illegible] LET X=X+1
[illegible]
87 IF ATTR [illegible] THEN GO TO 800
[illegible] IF ATTR [illegible] THEN BEEP [illegible]
[illegible]
95 LET T=T-2
[illegible] THEN PRINT AT 2,13; [illegible]
[illegible]
120 LET [illegible] LET T 200 [illegible]
[illegible] LET SC=0
130 GO TO [illegible]
500 PRINT AT [illegible] IN TIME [illegible]
510 INPUT A$: IF A$ [illegible] THEN GO [illegible]
520 STOP
800 FOR V=80 TO -20 STEP -1: BE[illegible]
```

```
[illegible] BORDER RND*[illegible] NEXT [illegible]
PRINT AT 10,0; [illegible]
[illegible]
5000 FOR A=0 TO 7: READ B: POKE USR "A"+A,B: NEXT A: DATA 24,[illegible]
[illegible]
5020 FOR A=0 TO 7: READ B: POKE USR [illegible] NEXT A: DATA [illegible]
[illegible]
5030 FOR N=29 TO 0 STEP -1
5040 [illegible]
5050 BORDER 0: PAPER 0: INK [illegible]
[illegible]
5100 PRINT [illegible]
5110 PRINT "YOU MUST GUIDE HIM AROUND AND MAKE HIM PICK UP THE BLUE [illegible] FLASHING ONE, THEN HE DIES."
[illegible]
5130 PRINT [illegible]
5140 PRINT " IF YOU PICK MOST OF THEM UP WITHIN THE GIVEN TIME YOU WILL GO ON TO A NEW [illegible]"
5150 PRINT "PRESS ANY KEY"
[illegible]
5170 PRINT AT 3,0; [illegible]
5180 PRINT AT 4,0; [illegible]
5190 PRINT AT 8,0; [illegible]
5200 PRINT AT 8,[illegible]
5210 [illegible]
5220 PAUSE 0: [illegible]
```

Robot Race
by Andrew Deighton

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This competition is designed just for young people — you must be aged under 18 on September 1 1983, in order to enter.

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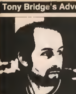
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Age

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The White Barrows

Self-confassed adventure junkie Nigel Morse is having some problems with Level 9's *Colossal Adventure*, Camell Software's *Black Crystal* and Automata's *Pimania*. Nigel used his free clue in *Colossal Adventure* to find out how to get into the plover room with the lamp. Now Nigel wants to know how to get batteries for the lamp and to find but where the colossal cavern is located.

Well, Nigel, I have to confass to my ignorance. Perhaps one of our readers can help.

Nick Darlow of Ilfracombe has a tip for anyone playing Acornsoft's *Sphinx*. There is a point in the adventure where you need to get past an elephant. The usual solution is to find a mouse ahd then drop it near the elephant, scaring it off. However, Nick thinks that he has discovared a flaw — just type 'drop mouse' whether you have a mouse or not, and you will be able to get past the elephant.

But Nick has a problem further on in the adventure. A gang of goblins keeps leaping on him and tearing him limb from limb. He has tried killing them, feeding them, paying them and throwing all sorts of objects at them, but to no avail. Any clues would be gratefully received.

Now Andrew Pennell has kindly provided the following review of *The White Barrows* by ASP.

Long ago in the Dark Ages (ie, before there were Sinclair Spectrums) a game called *Hunt the Wumpus* was very popular on micros and mainframes. It was ideally suited to teletype terminals as it was text only but, in its day, it was well liked.

The plot for *Wumpus* went something like this: deep underground there was a network of caves, interconnected by dark tunnels. The main inhabitant of these caves was a monster called a *Wumpus* with sucker feet and heavy breathing who did not like intruders invading his privacy. He built into some of his caves bottomless pits to catch the unwary, and trained his pet bats to lift intruders and transport them randomly in the network. The player was given a limited number of arrows with which to shoot the *Wumpus* if he should see him.

If you replace *Wumpus* with *Evil Sorcerer*, arrows with magic units, bats with magic spots and caves with chambers and put the program on a 48K Spectrum, you end up with *White Barrows* by ASP Software. Originally published as a listing for the Acorn Atom (remember them!) in a magazine, this version of *Wumpus* does have a few improvements over the old classic.

When you are in a chamber, you may get messages such as 'I can hear a dragon', and then, for example 'You are in chamber 24 — tunnels lead to 8 41'. You then have four options — *Create a Wall* which seems to do nothing, *Move* which lets you pass along a tunnel to another chamber, *View* which lets you look into an adjacent chamber, and *Plan*, which draws a map (a luxury that old *Wumpus* players never had). As no instructions were provided on my copy, I cannot say what *Create a Wall* should do, apart from using up precious magic units.

Also in the chambers are various monsters such as Dragons who you must fight, and a corrupt dwarf who will tell you where the Sorcerer is if you pay him enough.

When you eventually get adjacent to the Sorcerer the message 'The Chalice is near' appears. However, if you move into the chamber where the Sorcerer was, you get 'The Sorcerer has run away'. You can chase him as much as you like, but you never seem to catch him.

The *White Barrows* should have been good — the old *Wumpus* game could be made very sophisticated on the new generation of high-res colour micros, but ASP seem to have missed the opportunity. ■

This series of articles is designed for novice and experienced Adventurers alike. Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter. So if you have an Adventure you want reviewed or if you are stuck in an Adventure and cannot progress any further, write to Tony Bridge, Adventure Corner, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD.

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OHIO GAMES

M Golzar, of Cayman House, Gill Street, London E14, writes

Q **Could you please give me any details of games to suit my computer which is an Ohio Challenger 1P with 8K Ram in Basic and monitor. If you cannot help me, can you tell me where I can get help?**

A I must be honest and admit that I have not tracked down any software houses advertising games for the Challenger 1P. If any readers can help, perhaps they will write in and tell us.

The only people who might be able to help you whose address I have is The Ohio Scientific Users Group' which can be found at 19a West End, Street, Somerset.

CLONED COPY

Terry Stygall of Pinewood Close, Westbury on-Trym, Bristol, writes

Q **I have what is possibly a difficult question. There are a number of pieces of software on the market, which, despite the let-out clause, will allow people to pirate other people's software, without having to resort to tape to tape copying. As a writer of software this does irritate me.**

I recently bought copies of *Zap* and *Clone*, in order to try and find a way of beating them. I'm afraid that I haven't succeeded, but *I* know that a method *does* exist. If, for example, you try to copy *Zap* using either *Zap* or *Clone*, the system crashes. Attempts to copy *Clone*, using either *Clone* or *Zap*, meets with a refusal to *Load*.

The manufacturers of these copiers seem to be happy about people copying any software other than their own. Have you any idea how these copiers work? If so, have you any idea about how to stop them working?

A This is probably the most contentious subject in the business today, and such copiers as you mention are in the forefront of the battle. Indeed, as any regular attender of microfairs will tell you, *Zap* points out that Certain uses of Spectrum *Zap* can infringe the copyright law. Copying for private use is not illegal, and given the quality of some tapes that are being sold it is a positive aid.

A copier works by replacing the operating system in the Rom. Thus, in effect, any Rom based command simply does not exist, and so of course can have no effect. The real problem comes when trying to find out where these machine code routines are stored.

Because they are transparent to the system, at least as far as the user is concerned, the copier when *Loaded* cannot be in the user Ram area as that is all available. Logically, therefore, the copier is stored between *Prog* and 16384. I doubt if it is above Ramtop, though in all honesty I don't know. I would also guess that the systems variables are left clear as they are almost always used, as they stand, and I doubt that they could be copied and moved.

I am surprised that no one has yet found a way to beat the copiers, but I would be interested to hear from any reader who has actually failed to make a back-up copy of any tape. *Zap* has been around since before last Christmas, and I would expect someone to get some way into it sooner or later.

Remember, programs are written in different ways, and people storing machine code will do so in different places. Sooner of later, someone is going to try and store code in an area used by a copier. The copier goes in first, and then the program after. If the program was to overwrite the area where the copier was stored, then the copier would not work.

I am afraid that the only help I can give is a theory of how to beat the copiers. It would mean that any tape you supply must fill up the *entire* Ram. This is easier said than done, but it would ensure that whenever the copier was stored, it would be overwritten.

DISABLED STOP

T L Beckham of Eleanor Road, Bowes Park, London N11, writes

Q **Could you help me with the following problem. I would like to disable the *Stop* key on my latest version Pet, ie, the 96K version. *Poke 144, 49* does not work. Can you suggest an alternative?**

A The *Poke* commands you want on the 8096 are still at the same address, only the numbers have changed. If you want to disable the *Stop* key then use *Poke 144, 88*. If you want to later reinstate it, then you need the command *Poke 144 85*.

GRAPHIC SHAPES

James Sanderson of Learway Drive, Milton, Glasgow G22, writes

Q **Since getting my Spectrum I have become an avid computer user. While there is still a lot I do not understand, I am making progress.**

However, there is one thing that still leaves me bewildered and that is references in magazines to graphic *A* and others like it, for example *Balloons* (*PCW*, 7-13 April). I can understand how that applies to the little characters at the top, but when I use graphics with the letter *A* all I get is capital letters. Obviously, I am doing something wrong. Can you help me understand how to get these graphics?

A The Spectrum, along with many other computers, allows you to define your own graphic shapes and use them in programs. You are given certain basic shapes on the top row of the keyboard — squares, half squares, etc but you can create your own shapes and assign them to some of the other keys on the Spectrum (*A* to *U*).

You should consult the manual to see how to use user defined graphics — the important point to note is that the capital *A* you mention is an *A* got by pressing the key after you have gone into graphics mode, ie it is not just the ordinary capital. Somewhere else in the program a shape will have been designed and assigned to the *A* key.

STOP, PAUSE

A Morris of Tonbridge Avenue, Portsmouth, Hants, writes

Q **I am writing several maths programs for my ZX Spectrum (48K) and I would like them to *Pause* for an answer, for a couple of seconds. Then, if the answer is not entered in that time, it would be counted as wrong. The normal *Pause* will not allow an entry and *Input* has no time limit. Could you tell me how I can do this on my Spectrum?**

A A simple routine for entering answers has been around a long time for the ZX81 and it should transfer directly to the Spectrum. The length of the pause is determined by line 10 and the value of Z. The more times the computer has to execute the loop, the longer it will take.

```
10 PRINT "ANSWER NOW"
20 FOR Z=1 TO 100
30 LET A$=INKEY$
40 IF INKEY$="" THEN NEXT Z
60 IF NOT INKEY$="" THEN GOTO
   200
100 PRINT
110 PRINT "TOO LATE"
130 PRINT "YOU RAN OUT OF
    TIME"
150 STOP
200 PRINT
210 PRINT "WELL DONE"
220 PRINT "[illegible]"
230 PRINT "YOU ANSWERED IN
    TIME"
```

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Ian Beardsmore and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke, PCW*, 12-13 Little Newport Street, London WC2R 3LD.

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Warning It is illegal to advertise pirated software

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Please write your copy in capital letters on the lines below.

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WANTED PEOPLE WITH DRAGON to form club in the Slough area. Tel Slough 35268

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LYNX 48K, as new boxed manual, book home-made software £175. Tel [illegible]

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WANTED A SUPER EXPANDER for Vic20 in exchange for either cartridges and cassettes. Tel 041 5571533

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ADVENTURE HELPLINE

Micro *48K Sinclair Spectrum*
Adventure *The Hobbit*
Problem *How do you get into the barrel in the Elvenking's cellar to float down the river (What do you say?)*
Name *James Lilley*
Address *34 Corby Avenue, Swindon, Wiltshire SN3 1PK*

Micro *16K ZX Spectrum*
Adventure *Planet of Death*
Problem *I cannot get past a forcefield*
Name *Nicholas Harrison*
Address *33 Mount Drive, Nantwich, Cheshire*

Micro *Dragon 32*
Adventure *Ring of Darkness*
Problem *How to get the key off the jester without killing it also how to get out of the death mazes*
Name *Gary Ironman*
Address *22 Cooper Close, Aylestone, Leicester*

Micro *Vic20*
Adventure *The Count*
Problem *(1) How do I keep the stake over night? (2) How do I open the coffin?*
Name *Brendan Bradley*
Address *54 Ashwood Road, Clondalkin, Co Dublin, Ireland*

Micro *Dragon 32*
Adventure *Pimania*
Problem *Having converted all the items with the Pi men and got the lot through the green door up to the Ultimate Gate I've tried every password I can think of to open it and failed*
Name *Andy Marsh*
Address *41 Central Avenue, Bury BL9 9LX*

Micro *ZX81*
Adventure *Adventure C The Ship of Doom (Artic)*
Problem *I cannot open cover in key room also I cannot use specs without crashing the program*
Name *Brian Clark*
Address *73 Greenlaw Crescent, Glenrothes, Fife, Scotland*

Micro *48K Spectrum*
Adventure *Artic Inca Curse*
Problem *How do I put the fire out?*
Name *Kickstart*
Address *21 Red Courts, Brandon, Durham DH7 8QN*

Micro *BBC A (32K)*
Adventure *Adventure (program power)*
Problem *How does one get to capture the wise owl to pass the fierce cat?*
Name *Justin Nicholas*
Address *Robin Hill, Castle Court, Llandough, Near Cowbridge, South Glam CF7 7LZ*

COLOURED

VIC 20 Unexpanded

CHAR.

GENERATOR

SCORPION SOFTWARE

Character Generator is a utility program to aid Vic20 owners in designing their own Multi-Colour graphics

Written entirely in machine code, a block of four characters can be designed at a time with commands like *Upturn*, *Invert*, *Multi-Colour*, etc

The program comes complete with a fairly extensive leaflet, explaining how the program works and a keyboard overlay

Program *Character Generator*
Price *£4 95*
Micro *Vic20*
Supplier *Scorpion Software*
268 St Nicholas Drive
Grimsby
South Humberside
DN37 9RP

DEMI-BOLD

You may remember Cambell Systems' *Dlan* display language program that was mentioned here a while ago — it was a dedicated language for creating moving displays That program used *Multifont* from Image to create the type faces

Multifont is now available separately for the 16/48K Spectrum The system gives six fonts, for titles etc, to make a change from the usual Spectrum character set

Some of the descriptions of the designs in the accompanying manual caught my eye "A stylish demi-bold face with a modern up-to-date feel that goes well with just about everything ... this face has a classical feel to it" — nearly as bad as wine buffs

Program *Multifont*
Price *£4 95*
Micro *Spectrum 16/48K*
Supplier *Image*
185 Elm Road
New Malden
Surrey KT3 3HX

SCALING

Easiplot is a program for the BBC that enables you to draw various kinds of graph The program features automatic scaling and labelling with five different bar types and 10 different line types

The program comes with a 33 page manual and has been designed to work on both operating systems of the BBC and on Epson and Seikosha printers

Program *Easiplot*
Price *£15 95*
Micro *BBC*
Supplier *Synergy Software*
Dept 1
7 St Andrews Close
Slip End
Luton LU1 4DE

WORLD MAP

Things to do with your Spectrum other than kill aliens number 57 Learn Geography

Kemsoft is trying to take some of the pain out of learning towns and places and their location in the world by letting you use your Spectrum The computer displays a map of the world and you use the cursor keys to position a dot over a specified country

Geography 1 asks questions on the world and Great Britain Other programs in the series deal with Europe and England

Program *Geography 1*
Price *£6 50*
Micro *Spectrum 48K*
Supplier *Kemsoft*
The Woodlands
Kempsey
Worcester

CODE LINES

Lynx Basic is well suited to the incorporation of machine code, having, as it does, the ability to handle code lines

It's rather odd then, that *Coder* from FSL Software is the first assembler/disassembler I've seen for the machine

The program works with the code lines but also provides access to free Ram and Rom It lacks some features of a full assembler, but is relatively cheap at £7 50

Program *Coder*
Price *£7 50*
Micro *Lynx*
Supplier *FSL Software*
13 St Ronan's Avenue
Southsea
Hants PO4 0QE

3-D MAZE

Mazemania is a 3D maze game for the Spectrum It comes from a new company Base Two Software which intends to specialise in ZX programs

The idea of the game is to move around a 3D maze avoiding dangers like holes and searching for a key and other sundry goodies

Program *Mazemania*
Price *£4 90*
Micro *Spectrum 48K*
Supplier *Base Two Software*
9 The Copse
Lindfield
Sussex RH16 2EZ

WATERSKI

AQUAPLANE

Amongst the new batch of Spectrum releases from Quicksilva is *Aquaplane* by John Hollis For those of you who don't know John wrote *Time Gate* which was, for its time, something of a classic

Aquaplane is not intended to be a follow up to *Time Gate* — we will have to wait a while for that The setting is the Cote d'Azur and you are happily skiing along when you start to notice various obstacles in the water

The game has the usual hi-res graphics and, interestingly, a full screen display — somehow John has managed to get the border to display more than one colour

Program *Aquaplane*
Price *£6 95*
Micro *Spectrum 48K*
Supplier *Quicksilva Ltd*
13 Palmerston Road
Southampton
SO1 1LL

MATHS

It seems to be spreading At first it was only BBC parents who insisted their kids gave up playing games and forced them to do educational things with their computer — now it's the Dragon

Tele-Tutor 1 is a lavish folder containing two cassettes and a manual Subjects covered include Spelling, Maths, Vocabulary, etc All are written in machine code, which suggests that some effort has gone into it — I should hope so, it costs £25

Program *Tele Tutor 1*
Price *£25*
Micro *Dragon 32*
Supplier *Microdeal*
41 Truro Road
St Austell
Cornwall
PL25 5JE

SAVE & LOAD

Claiming to be a "business spreadsheet for home computers" *PractiCalc Plus* is said to have many more features than any comparable spreadsheet

The 16K Vic version has 2,000 cells, a cell by cell or whole sheet formatting option, and full replication across columns and rows

If, like me, you find yourself largely baffled by spreadsheets, I expect you'll find this last feature most important — a 65-page manual

Program *PractiCalc Plus*
Price *£29 95*
Micro *Vic (24K 16K has 600 cells)*
Supplier *Computer Software Associates*
Goddard Road
Whitehouse Ind Est
Ipswich
Suffolk IP1 5NP

NEW RELEASES

TIME CHECK

Do you want to plan your life up to two years ahead? Then the Aspic *Timeplan* could be for you

The program is a menu driven "wall chart' which enables you to allocate time to various tasks

The program will total up how many hours are committed to various tasks and also remind you at various points of what you are supposed to be doing

Program *Timeplan*
Price *£11 95*
Micro *Spectrum*
Supplier *Aspic*
238 Warwick Road
Solihull B92 7AE

HORRIFIC

Creepy Computer Games is the title of a book from Usborne that manages to look quite unlike any other computer book I ve seen

First the games in the book have been designed to work (with small modifications which are listed) on more or less all of the popular home micros

More impressive is the design of the book which is chock-full of illustrations, including a particularly horrific Spiderwoman Although thin at 99p it seems good value

Book *Creepy Computer Games*
Price *99p*
Micro *Most popular micros*
Supplier *Usborne Publishing*
20 Garrick Street
London WC2E 9BJ

METALLIC

Why is it that computer speech always ends up sounding exactly how those dreadful 50 s films predicted it would — metallic and emotionless?

Super Talk from Abbex may be a different kettle of fish (or kate-ill ov fee-shin in computer speak)

Unlike the hardware add-ons which typically cost £25 or £30 this is just a tape The program works by you recording the words you require and telling the computer how they are spelt — it should then recognise the series of letters in the word and speak it

This method is not only cheaper but it is claimed that it is possible to put some character into the speech

Program *Super Talk*
Price *£5 95*
Micro *Spectrum 48K*
Supplier *Abbex*
Tavistock House
34-36 Bromham Road
Bedford MK40 2QD

LICENCE

It would be an understatement to say that I have seen quite a few ' you are the pilot fight off the enemy fighters"-type games but *Strike Attack* is different

In *Strike Attack* you appear to need a pilot s licence before you can even understand the manual (well, I may be being a little unfair but it is at least as difficult as any other flight simulation program) Not only do you have to fly the plane but also have to fight off various fighter attacks and drop bombs

In short, it is definitely not an arcade type shoot 'em up game, but if you enjoy complicated programs like Psion's *Flight Simulation* you should enjoy this

Program *Strike Attack*
Price *£6 95*
Micro *Spectrum 48K*
Supplier *Micro Mart*
Micro House
Greenhill Industrial Estate
Kidderminster
Worcs

STORMTROOPER

Cygnus is the first adventure game I've seen for the Jupiter Ace

The adventure requires 19K — a 3K Ace with 16K expansion — and contains some graphics to illustrate the plot

As is usual with adventures the cassette blurb doesn't give much away so it's difficult to say anything about the game The cover has a rather nasty stormtrooper on it so I expect the game contains the requisite amount of death and destruction

Program *Cygnus*
Price *£6 95*
Micro *Ace (19K)*
Supplier *Richard Roberts*
52 Whalesmead Road
Bishopstoke
Eastleigh
Hants S05 6HL

DEADLY DORIS

Program Power s *Killer Gorilla* must be one of the most successful BBC games ever

The author of that program now has a game out — *Escape From Moonbase Alpha*

As Joe, you have been left for dead by your fellow crew members in a mysterious complex known as Moonbase Alpha You have to find your way to freedom via a kindly doctor and his time machine

Among the problems you might encounter on your way to freedom are the Green Grappler, Deadly Dons — Metal Mauler, The Demon and the less threatening sounding Marvin,

The graphics are all 3D and if things get really desperate you can take a Hulk pill and walk through walls

Program *Escape from Moonbase Alpha*
Price *£7 95*
Micro *BBC B (A + 32K)*
Supplier *Micro Power*
8/8a Regent Street
Chapel Allerton
Leeds LS7 4PE

New Releases is designed to let people know what software is coming on to the market If you have a new game or utility which you are about to release send a copy and accompanying details to New Releases Popular Computing Weekly 12 13 Little Newport Street, London WC2R 3LD

Ziggurat

Fact of factoid?

I would like to introduce you to a new word The word came from I know not where fen I first came across it a couple of years ago It is a good word even though used by people in advertising marketing and similar areas (eg video)

The word is factoid

Just as a humanoid is like a human but only pretends to be human so a factoid looks like a fact, but is only pretending to be a fact The suffix -oid' comes from the same Greek root (eidos) as idea Get the eidos?

Propaganda abounds in factoids Example the *Computer Horizons* feature in *The Times* for Tuesday July 26 included a section entitled *Speak up the computer will be listening* by Ian White He writes

> The good news is that within five years or so the keyboard will be used only by the most esoteric of commands Voice recognition will be the norm before the decade is out.

No prizes for spotting the factoide

The author of this mess of factoids must have reasons for making these assertions Let us examine some of them Before we analyse his reasoning however first think — how many typists are there and how many are frightened of the keyboard they use every day?

The article starts by positing that the market in computer technology is being held back by what is described as the techno-fear of thousands of potential computer users who freeze at the sight of a keyboard and baulk at the prospect of communicating with an inanimate object A factoid of the purest untenability

On the one hand are all typists (a group in which I include myself) really special creatures who have managed to overcome a vastly irrational fear of typewriters and keyboards? And are all those who are in love with cars and with driving (in which I do not include myself) really outlandish and strange? (YES!)

The fear of computers is a vastly over stated myth I have heard real people say that they were frightened by computers but often it seems to be a protection against over enthusiastic selling I have yet to find a child who is frightened of computers (though there must be some I hate cars)

According to Ian White in five years or so" young people coming out of schools will have been incubated with computers at home and in the schools and their parents will be totally at home with these beepy pingy wastes of time Who actually is so full of "techno-fear that talking to a computer is going to help?

To make the factoidal assertion that voice commands will be used for all except the most esoteric commands, within five years is foolhardy at the very least At most it is confusing and misleading because it is given as a fact rather than one opinion Computing and especially Artificial Intelligence often get a bad reception in many quarters — largely the result of such blatant factoids.

Whether or not the technology is actually capable of delivering the goods in the time span specified begs a question How can we be sure that people will be happier talking to a computer? Will they be any more productive?

The main thrust of the fear of ' techno-fear comes from those managers and executives who were promoted beyond their level of competence at a time when the competition for jobs was not as great as it is now Techno-fear" is mainly the preserve of the no longer young-in-mind (and there is no necessary correlation with chronological age)

I have — at long last — bought a watch Not wishing to be the same as everybody else I bought a quartz analogue watch

There were a few real reasons — see how much time you have left You can tell the time from almost any direction It looks far better is more aesthetically pleasing

Anyway I bought it (with a leather strap and no figures to clutter the dial only the date) I asked the assistant Sell many analogue? , and he answered ' More than we do of the digital People like them easier to use"

I think it is easier to type than it is to talk Enough said ■

Boris Allen

Puzzle

A winning line

Puzzle No 99

Jamie has a new calculator again It even has a key marked ! that will work out factorials

The factorial of a number is obtained by multiplying together all the integers up to and including the number So factorial 4 — or 4! as it is usually written — is equal to 24 ie 1 • 2 • 3 • 4

Jamie said ' It's very useful For example, in this competition in the newspaper you have to place ten listed features in order of merit As the number of different permutations is equal to 10! I can instantly find that to make sure I get a winning line I would have to send in 10! or 3 628 800 entries

I've found another interesting thing with factorials he continued I've found a number 145 which is equal to the sum of the factorials of its digits He showed me that 1! + 4! + 5! was as he said equal to 145

Apart from the single digit examples of 1! and 2! which also have this property and apart from 145 there is one other number with this property

What is it?

Solution to Puzzle No 94

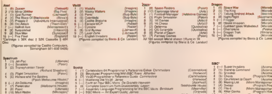
```
10 LET N = 1
20 LET T = N • N + 321
30 LET S = SQR T
40 LET S = VAL STR$ S
50 IF S = INT S = 0 THEN PRINT N • N T
60 LET N = N + 1
70 GOTO 20
```

There are four possible solutions Squares with sides before and after the addition of 312 teachers of 7 and 19 23 and 26 37 and 41 and 77 and 79 By looking at the number of pupils and the corresponding pupil/teacher ratios the most likely solution is 77 — 5929 children giving a pupil/teacher ratio of almost 19

Winner of Puzzle No 94

The winner is Ruth Story St Andrews School Rochester Kent who receives £10

Top 10



Atari

1 (6) Zaxxon (Datasoft)
2 (10) Miner 2049er (Big Five)
3 (3) Grid Runner (Llamasoft)
4 (4) The Rise Of Blackpoole (Rinva)§
5 (7) Preppie 2 (Adventure International)
6 (9) Orc Attack (Thorn-EMI)*
7 (—) Hellcat Ace (Microprose)†‡
8 (2) Suspended (Infocom)§
9 (8) Blue Max (Synapse)†
10 (—) Fire Fleet (English)†

*Cartridge ‡ 38K disc † 32K Cassette § 48K Disc

(Figures compiled by Castle Computers, Birmingham 021-632 6458)

Vic20

1 (1) Wallaby (Imagine)
2 (2) Wacky Waiters (Imagine)
3 (3) Panic (Bug-Byte)
4 (5) Cosmiads (Bug-Byte)
5 (6) Castle Sharma (Imagine)
6 (—) Escape MCP (Rabbit)
7 (—) Cyclone (Rabbit)
8 (8) Grid Runner (Llamasoft)
9 (7) Laser Zone (Llamasoft)
10 (—) English Invaders (Rabbit)

(Figures compiled by Boots & Co London)

ZX81*

1 (8) Space Raiders (Psion)
2 (10) Espionage Island (Artic)
3 (1) Football Manager (Addictive Games)
4 (3) Flight Simulation (Psion)
5 (5) 1K Games (Artic)†
6 (6) 1K Chess (Artic)†
7 (2) Defenda (Quicksilva)
8 (4) QS Scramble (Quicksilva)
9 (9) Planet of Death (Artic)
10 (7) Fantasy Games (Psion)

All 16K except Island shown † Runs in 1K

(Figures compiled by Boots & Co London)

Dragon

1 (8) Space War (Microdeal)
2 (5) The King (Microdeal)
3 (7) Talking Android Attack (Microdeal)
4 (8) Night Flight (Salamander)
5 (—) Frogger (Microdeal)
6 (6) Houses Invasion (Microdeal)
7 (—) Cuthbert goes Walkabout (Microdeal)
8 (—) Champions (Peaksoft)
9 (—) Dragon Trek (Wintersoft)
10 (—) Shuttle (Microdeal)

(Figures compiled by Boots & Co London)

Spectrum

1 (1) Jet-Pac (Ultimate)
2 (—) Scrabble (Psion)
3 (2) Transylvanian Tower (Richard Shepherd)
4 (3) Flight Simulation (Psion)
5 (5) Horace and the Spiders (Psion Melbourne House)*
6 (—) Ah Diddums (Imagine)
7 (7) Penetrator (Melbourne House)
8 (8) Pssst (Ultimate)
9 (10) Mad Hedge (Mikrogen)*
10 (4) Horace Goes Skiing (Psion Melbourne House)

*Requires 48K

(Figures compiled by W H Smith & Sons)

Books

1 (1) Commodore 64 Programmer's Reference Guide Commodore (Commodore)
2 (3) Structured Programming With BBC Basic Atherton (Horwood)
3 (7) Vic20 Programmer's Reference Guide Commodore (Commodore)
4 (—) Mastering the Vic20 Jones (Horwood)
5 (—) Forth on Your BBC Micro De Grandis-Harrison (Acornsoft)
6 (6) Complete Spectrum Rom Disassembly Logan (Beachcombe House)
7 (—) Assembly Language Programming for the BBC Micro Birnbaum (Macmillan)
8 (—) BBC Micro — An Expert Guide James (Granada)
9 (2) Spectrum Hardware Manual, Dickens (Melbourne House)
10 (9) Z80 Assembly Language Programming Leventhal (Osborne)

(Figures compiled by Watford Technical Books, Watford 0923 23324)

(Last weeks position in brackets)

BBC*

1 (—) Super Invaders (Acornsoft)
2 (1) Starship Command (Acornsoft)
3 (5) Snooker (Acornsoft)
4 (6) Chess (Program Power)
5 (2) Countdown to Doom (Acornsoft)
6 (9) Mailing List (Micro Management)†
7 (4) Sweep (Program Power)
8 (7) File-it (Micro Management)†
9 (8) Killer Gorilla (Program Power)
10 (—) Worldwise (Bourne Educational)

*Model B only † Disc

(Figures compiled by Ipswich Micro Management Ipswich 0473 58181)

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After months of painstaking research, asking personal questions and getting punched in the gob for it, Automata U.K. now presents

BITS OF THE PIMAN'S FAMILY TREE

MUDGAARD - THE VIKING PIKING THIS BIT OF FOREIGN BLOOD DIDN'T DO TOO WELL, AS HIS SWORD AND SHIELD WERE MADE OF CARDBOARD

NEANDERPIMAN HE OUGHT TO KNOW ABOUT FAMILY TREES - HIS FAMILY LIVED IN ONE!

EEK!

Earth

Live

LILLY LANGPI, OR 'THE WOOLLY JERSEY' OR SOME SUCH SOFTWARE 'GOOD PALS' WITH OTH WILDE, AUTHOR OF 'THE IMPORTANCE OF ME AN ERNEST'

W.C.

DICK PIMAN - COLD HEARTED VILLAIN WHOSE DOWNFALL CAME THROUGH HIS SHORT MEMORY - HAD TO KEEP TAKING OFF HIS MASK TO SEE WHO HE WAS

QUEEN PIADECEA SHE NEVER COULD GET THE HANG OF CHARIOTS, POOR SAUSAGE'

PIDO THE LESS SAID ABOUT THIS INCIDENT THE BETTER

Evans

SIR WINSOM PIHILL: THE ENEMY, MISHEARING A STATEMENT BY HIM, GAVE UP AT ONCE 'WHO ARE THESE BARBARIANS WHO WILL BITE US ON THE PEACHES WHATEVER THEY ARE?' LIVED TO 107

ALBERT SALVADOR PI ARTIST WHO EXCELLED IN FINGER PAINTING ALAS HE COULDN'T PAINT ANYTHING ELSE!

EDWIN PIBEAT WANTED TO RIVAL THE BEATLES, BUT COULDN'T AND STILL CAN'T PLAY A NOTE. NOW ROADIE FOR CLAIR SINCLIVE & THE PIMEN

OUR VERY OWN PIMAN THIS MISCHIEVOUS LI'L DEVIL AFTER ALL HIS FAME IS SEEING A TOP SHRINK FOR HIS RECENT PIDENTITY CRISIS

FAR THE STORY SO

DESPITE GROUCHO'S ATTEMPTS AT BRIBERY, SPECTRUM WHAT'S BOTH HE AND PIMAN AT 'GO TO JAIL' EVERY TIME

PIMAN DECIDES TO CALL UP SOME PALS OF HIS TO PLAY

BUNNY AND WHO?

E.T.! THEY STAR IN KIDS GAMES, AND THEY'RE BORED JUST NOW SO

AND ANOTHER THING - THEY'RE REAL PACIFIST CATS YOU KNOW?

HEY, HANDSOME GUY CALLED PIMAN PHONED CAN YOU GET OVER RIGHT AWAY!

WOW! HE OWES ME NOW PEACE OKAY

BUNNY HEY WHAT'S THE DEAL?

PIMAN'S PLACE

I HOPE IT'S GOOD! I JUST GOT CALLED AWAY FROM A CARROT EATING CONTEST

HI GUYS - I KNOW HOW BORED YOU ARE SO I'VE INVITED YOU ROUND TO PLAY MY NEW GAME

POLICE

SO MUCH FOR NON VIOLENT GAMES

WILL PIMAN'S LITTLE FRIENDS GO TO JAIL FOR REAL? AH - WHO CARES!